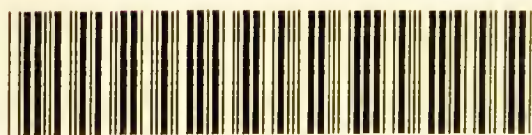






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HOOPER'S

PHYSICIAN'S VADE MECUM:

A Manual of the Principles and Practice of Physic ;

WITH AN OUTLINE OF GENERAL PATHOLOGY,
THERAPEUTICS, AND HYGIÈNE.

SEVENTH EDITION,

GREATLY ENLARGED AND IMPROVED.

BY

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AUTHOR'S PREFACE.

THE following concise account of the several diseases that fall under the province of the Physician was committed to the press, with the hope of its proving useful to students, and those practitioners in medicine who, from their professional occupations, or other circumstances, may not have it in their power to consult the more voluminous works that have contributed so much to the improvement of medicine.

The very extensive sale of the work, and its having been translated into most of the continental languages, induce the Author to believe that his labours have been generally approved.

It has been his object to compress, within a smaller compass than has hitherto been done, consistently with utility, everything which more especially deserves attention with a view to the treatment of diseases. In pursuing this design, he has discarded all theory, and retained only those leading facts with which it is absolutely necessary for a practitioner to be acquainted when he approaches the bedside of his patient.

Under distinct heads are arranged—

1. The characteristic symptoms by which diseases are known.
2. The causes from which they most frequently have their origin.
3. The circumstances that more especially point out the difference between diseases which resemble one another.

4. The signs which influence the judgment in forming a prognosis of their event.
5. That mode of treatment which, in the present improved state of medicine, is deemed most appropriate, and which experience has sanctioned.

The select collection of Formulæ, Glossary of Terms, and the Table showing the Doses of all valuable medicines he employed, will, the Author trusts, combine to render the volume more extensively useful.

Savile Row, August, 1823.

EDITORS' PREFACE.

A WORK to which the familiar name of Dr. Hooper is attached must of necessity find its way into the hands of many readers. This consideration gives to it an importance which would not otherwise belong to it; and it is this which induced the present Editors to undertake the task of preparing it for the press.

From the Author's Preface, it appears that the only object contemplated in the first editions of this work, was that of furnishing a concise treatise on the practice of medicine for the use of the student and practitioner. After the Author's death, however, an Introductory Part was added, containing a short outline of Physiology, Pathology, and Therapeutics, some brief directions for Clinical Examination, and a sketch of Symptomatology and Semeiology. This part, which did not occupy more than sixty-five pages, was entirely re-written by Dr. Guy, who is mainly responsible for the additions and alterations which will be found in the present edition.

In its present form, therefore, this work consists of two parts, corresponding to what is commonly understood by the terms General and Special Pathology and Therapeutics.

The First Part contains six chapters. The first chapter, headed "Health and Disease," consists partly of definitions and explanations of terms, and partly of practical observations on the circumstances which exert the strongest influence on the human body in its healthy and morbid state. The second chapter treats of the Causes of Death; and comprises a brief account of the leading causes registered in England, as well as of the chief modes of dying. An outline of Physiology and General Pathology forms the subject of the third chapter, in which an attempt is made to bring together those facts and theories that admit, either directly or indirectly, of practical application. Those functions of the

body which attract most attention at the bedside, and those methods of examination which are of most constant application, form the subjects of the fourth chapter. They are the examination of the urine; of the chest and abdomen; of the pulse and respiration; and of other symptoms and signs of disease not readily referred to either of these heads. The fifth chapter treats of Hygiène private and public; and comprises short treatises on Climate, on Mineral Waters, on the Hygiène of prisons, workhouses, and hospitals, of ships and barracks, and on Dietarics, this latter division being introduced for the first time. The sixth chapter contains a brief outline of General Therapeutics, with a short addition by Dr. Harley on Nursing.

The chief aim of this First Part is to make the work useful as a book of reference at the bedside; at the same time several parts are so connected as to offer some inducement to the reader to study it as a whole. In this part, too, Dr. Guy has embodied his own original observations on the pulse and respiration.

In the Second Part, which answers to the original work, very extensive alterations have been made; and for these Dr. Harley is chiefly responsible.

Many liberties have been taken with the original text. The prescriptions have been brought together at the end, and carefully arranged under distinct heads, instead of being scattered through the body of the book; many diseases not described in former editions have been introduced; many others which were only incidentally mentioned are treated under separate heads; and a still greater number have been so much altered as to be nearly new.

Among the additions to the Second Part made by Dr. Guy, in the *first* of the six editions intrusted to his care, may be mentioned, general observations on continued fevers, puerperal fevers, plague, muscular rheumatism, neuralgia, cephalalgia; and among the diseases which underwent the greatest alteration, infantile fever, diarrhœa, hydrophobia, laryngitis, asthma, phthisis, diabetes.

In the *second edition*, still more extensive alterations and additions were made. Many diseases, not described in any former edition, were added; many others were materially curtailed by the omission of observations not having a practical bearing, and the work was increased by a brief description of the diseases of the eye, ear, and skin.

In the *third edition*, also, great additions and alterations were made. The First Part was revised, and in more than

one place re-written, extended from 163 to 209 pages, enriched with several woodcuts (chiefly illustrative of urinary deposits), and by a short account of the principal remedial measures generally embodied in the term "Hygiène." In the Second Part, several diseases were re-written; of which the most important are gangrene of the mouth, and Asiatic cholera; others were for the first time placed under distinct heads; and extensive alterations, required by the improved state of medical science and practice, were made. The Formulæ, also, were carefully revised, and received several important additions; and the several classes of Prescriptions were, for the first time, preceded by a list of all the most important preparations of the London Pharmacopœia, together with their doses. In consequence of these additions to the First and Second Parts, the third edition of the work was extended from 523 to 576 pages.

The additions and improvements made in the *fourth edition* were, perhaps, more extensive than those which were introduced into any former edition. Several additional woodcuts, and much new matter, were added to the First Part. Much of the new matter, and the chief improvements in the First Part, were embodied in the Chapter on the Examination of the Heart and Lungs. The changes in the Second Part consisted of some transposition of the early Chapters, and the addition of two new Chapters, the one treating of parasitic animals, and the other on the symptoms and treatment of poisoning by the three leading classes of poisons. The former of these Chapters is illustrated by woodcuts. The Formulæ, and the list of preparations of the London Pharmacopœia, were revised, and the antidotes for the poisons were added. The Glossary of Terms which existed in the original work of Dr. Hooper was also restored. The additions and alterations in this Edition extended the work from 576 to 660 pages.

In the *fifth edition* extensive alterations were made both in the First and in the Second Part. In the First Part, the Chapter on the Examination of the Blood was omitted, on account of the little practical importance which now attaches to the appearance of the blood as a sign of disease; and the contents of that Chapter were transferred to Chapter 3. That portion also of the third Chapter which relates to the mind in health and disease was re-written; and other additions and alterations were made throughout the First Part, by which it was extended from 221 to 239 pages. The Second Part was enlarged by the introduction of three diseases, Cellu-

litis Venenata, Spermatorrhœa, and Farunculus, and by many important additions and improvements in the text of the preceding edition. The most considerable of these additions and improvements were found in the diseases belonging to the class of epidemic and contagious maladies, including Cholera, Dysentery, and Yellow Fever. In the Second Part equally with the First, however, the additional matter was out of all proportion to the increase in the number of pages. One woodcut illustrative of paralysis of the facial nerve was added.

In the *sixth editton*, the First Part was still further enlarged by 36 pages, occasioned partly by the addition of a Chapter on the Causes of Death, partly by the enlargement of that portion of Chapter V. which relates to the Preservation of Health. The Second Part was curtailed by a careful condensation, which was found consistent with some useful additions, chiefly under the heads of Cachexia, Ulcer of the Stomach, and Diphtheria. The woodcuts were subject to careful revision, and several additions were made to their number both in the First and Second Part.

In the *present edition* (which, as already stated, has been mainly entrusted to the care of Dr. Harley) very important additions and improvements have been made. Besides minor alterations and additions to be found in almost every page, upwards of 150 pages of entirely new matter have been incorporated into this part of the work.

The following are the chief additions and alterations:—In the division of *General Diseases*, Chapter II., The Symptoms and Diagnosis of Dropsy. In Chapter III. Fevers have been re-classified, and 20 pages of new matter on Typhus, Enteric, and Relapsing Fevers added. In Chapters IV. and V. the section on Diphtheria has been re-written, and that on Pyæmia, as well as general remarks on the nature of Puerperal Fever added. In Chapter VI. additions have been made to the pathology and treatment of Gout.

In the division of *Special Diseases*, Chapter I. has been extended by paragraphs on the diagnosis and morbid anatomy of diseases of the Brain (pp. 411 and 416), and by the sections on Chronic Softening, Atrophy, Induration, and Hypertrophy. Some general remarks on the diagnosis of diseases of the Cord, and the section on Hysterical pain have also been added to this chapter, and the subjects of Hemiplegia and Paraplegia have been nearly re-written. The chief additions to Chap. II. will be found at pp. 476, 477, on the administration of Chloroform; at pp. 485—487, on diseases of the valves of the heart;

at pp. 491—494, on the development of *Echinococcus* in the heart, Obliteration of the arteries, Atheroma, and at p. 497, on diseases of the veins.

In Chapter III. three pages have been devoted to the use of the Laryngoscope, and to special diseases of the Larynx; the subject of Bronchitis has been re-written, and paragraphs added on the local symptoms of Pneumonia and the Morbid Anatomy of Phthisis. Hydrothorax and Empyæma have been nearly re-written. Chapter IV., on Diseases of the Alimentary Canal and Abdominal Viscera, has been rendered much more complete. The following subjects comprise the new matter: Thrush, and some of the other forms of Stomatitis; Congestion, Cancer, and "Other forms of stomach disorder." Enteritis and Diarrhœa have been re-written, and articles on Obstruction of the bowels, Tubercular Peritonitis, Congestion, Cirrhosis, Acute Atrophy, "Other organic diseases of the liver," Icterus Neonatorum, and on the pathology of Jaundice have been added. In Chapter V. Nephritis has been re-written, "Other diseases of the Kidney" added, much addition made to Hæmaturia, Diabetes, and Chylous Urine, and a new view of the cause of the latter disease given. Chapter VI., on the diseases of the organs of generation, has been greatly extended. Amenorrhœa and Leucorrhœa have been partly re-written, and, excepting Dysmenorrhœa, Metritis, and Spermatorrhœa, the rest of this chapter is quite new.

In Chapter VII., Diseases of the Eye, have received that attention which the rapid advances of Ophthalmoscopic medicine rendered due to them. In this country these diseases have been almost entirely neglected by the Physician; but it is quite obvious that those treated of in the following pages come as much within his province as pneumonia or pleurisy. The causes of Deafness have been brought together at p. 685. Chapter VIII., On Cutaneous diseases, has received some considerable alterations and additions. Something has been done towards a more scientific classification and nomenclature. Order I. of the parasitical affections has been made more complete, and Order II., excepting Favus, has been re-written, and the section on Fungus foot added. The non-parasitical diseases have received little or no alterations, and only the addition of the section of *Malum Alepporum*.

In Chapter IX. the Trichinatus disease has received notice, and other additions made, the chief of which will be found in the section on Tænia, and the list of parasites infesting man, at the end of the chapter.

The Glossary has been enlarged and indexed.

The Classification of remedies, and the Formulæ have been carefully revised in accordance with the new Pharmacopœia: the latter have been for the most part re-written and simplified. Much as innovations in such a work as the present are to be deprecated, the change of weights instituted by the Medical Council has compelled us to adopt a symbol in place of the $\mathfrak{z}$ and $\mathfrak{D}$, in order to facilitate prescribing, and to prevent the mistakes entailed by the frequent use of combinations of several figures.

Fifty-four new Woodcuts have been employed, and a list in which their sources are acknowledged, is added.

In making the extensive changes and additions above indicated, the original intentions of the Author to make this work practically useful to the Student and Practitioner, have been strictly adhered to, and we believe that it will now be found to be the most comprehensive work of the kind which has hitherto been published in this country.

The Editors must acknowledge their obligations to the following Authors, whose works, referred to in the text, have afforded them valuable assistance:—To Drs. Aitken, Beale, G. Budd, Brinton, Brown-Séguard, Donders, Frerichs, Jenner, G. Johnson, Garrod, F. Küchenmeister, Liebreich, Murehison, Trousseau, Tweedie, T. Watson, C. West; to Professors Siebold and Virchow; and to Messrs. J. W. Hulke and H. Lee.

Original observations, or practical remarks, embodying the results of the Editors' own experience, are distinguished by the initials G. and J. H.

WILLIAM A. GUY.
JOHN HARLEY.

26, Gordon Street,
King's College,
August, 1864.

INTRODUCTION.

THIS book is intended to be, in the widest and truest sense of the term, a practical work; that is to say, it aims at bringing together, in a small compass, and in a form easy of reference, those items of information which the practitioner would desire to possess when he stands at the bedside, or when he studies an individual case with a view to its treatment.

The first and most obvious requisite for a practitioner is the facility of recognising a disease when he sees it, of distinguishing it from others which resemble it, and of foretelling its probable course and termination. The treatment which he adopts will be judicious in proportion to the readiness with which he recognises, and the accuracy with which he discriminates diseases; and will be either rational or empirical, according as he does or does not understand their real nature and true cause.

But a facility of recognising and discriminating diseases, a knowledge of their nature and causes, of their ordinary course and termination, and of their appropriate treatment, though essential to sound and successful practice, are not the only qualifications for it. There is a vast amount of information of a truly practical character, which does not find a place in formal descriptions of individual diseases, though comprising all these particulars. Such descriptions must be regarded either as condensed histories of the more perfect forms of disease, or as abstracts of the leading features observed in the ordinary run of cases, with an occasional notice of the more remarkable exceptions to the rule; but age, sex, and original and acquired peculiarity of constitution, give rise to differences in health, or habitual departures from it, which, in a remarkable manner, affect the severity and even the character of diseases. Hence a knowledge of the mode and degree in which both health and disease are affected by difference of age and sex, and of constitution, whether original or acquired, is not less essential to safe and successful practice than is a special description of diseases themselves.

The list of the necessary acquirements of the practical physician, however, is not yet complete. It often happens that, at the bedside, great importance attaches to an individual symptom, and questions occur in relation to it, which are not, and cannot be, answered in the short space devoted to the description of the disease of which it forms a part.

The symptom may be common to several diseases, or it may be a question whether, though assumed to be a symptom of disease, it be not compatible with health. Moreover, there are many symptoms or signs of disease which are detected only by very close examination, and by the use of instruments or of chemical tests; and in using these instruments and applying these tests, many precautions are necessary that are not easily borne in mind, and with regard to which the practitioner may often require to refresh his memory.

One other consideration suggests itself in this place. No man, whatever his pursuit, deserves the name of a practical man whose knowledge and resources are limited by the experience of those who have gone before him. In all employments, and in none more than in the practice of medicine, new events and rare combinations are continually presenting themselves, which can only be understood and successfully encountered by the aid of general principles. Hence the necessity for the physician of a knowledge of pathology and therapeutics, which supply the general principles that are to guide him in treating cases of disease, or complications of which he has no previous experience.

A physician who is well versed in all these particulars may lay claim to the title of *learned* in its best sense: if he have made this knowledge his own by diligent observation at the bedside, and by the constant use of instruments and application of tests, by which alone the value of symptoms can be determined, he will have earned for himself the name of *experience*; and if to learning and experience he unite the faculty of prompt and ready use of the knowledge which he has acquired, he is truly a *practical physician*.

A very wide and comprehensive meaning is here given to the terms *learning* and *experience*, and to the phrase *practical physician*. Indeed, it is of the first importance that these words should not be used in a low and vulgar sense. It is too much the custom to call a man a practical physician because he gives no time or attention to anything but the routine duties of his profession; and to deny him that title if he devote his leisure to what are called scientific pursuits, even though those pursuits should be in immediate connection with, and have a direct bearing upon, practice. A strong conviction that no man is truly practical who is not also possessed of an extensive scientific knowledge of his profession, has presided over the preparation of this work, and has induced the Editors to extend it beyond the limits usually assigned to a so-called practical treatise.

In order fully to carry out the practical views here indicated, this work is divided into two distinct parts, of which the first embraces, in a connected form, those more general considerations that make up the sciences of General Pathology and Therapeutics, while the second contains, in a form easy of reference, a description of diseases, their diagnosis and prognosis, their rationale, and their treatment, or what is usually known as the Practice of Medicine.

The First Part is divided into six chapters, under the following titles:—1. *Health and Disease*, comprising such general observations

upon either as seem to have the most practical bearing; pointing out the way in which both are varied by age, sex, temperament, and mode of life, and concluding by an explanation of the terms in common use for distinguishing diseases from each other, and giving precision to our views and statements concerning them. 2. *Causes of Death*.—In this chapter some of the leading facts that have been ascertained in reference to the causes of death are brought together with a view of giving to the student and practitioner some idea of the relative frequency and importance of the diseases which prove fatal to human life. 3. *Outline of Physiology and General Pathology*.—In this chapter those facts and theories which have the most direct bearing upon the practice of medicine are brought together, and briefly stated, all unnecessary discussion being carefully avoided, and the more important and minute details being reserved for—4. *Examination of some of the more important Symptoms and Signs of Disease*, comprising the Urine, the Viscera of the Abdomen and of the Chest, the Pulse, and the Respiration. Chapter 5 treats of Hygiene private and public; while Chapter 6 contains *An Outline of General Therapeutics*, which comprises such general principles as have been laid down for the preservation and improvement of health and the treatment of disease, together with a classification of the principal remedies, and an account of their mode of operation.

The Second Part, or the Practice of Medicine, properly so called, is also distributed into chapters as follows:—1. States of System, as distinguished from diseases properly so called. 2. Local Diseases, affecting all or several of the organs or textures of the body. 3. Febrile diseases, without essential local complication. 4. Febrile diseases, with essential local complication. 5. Febrile diseases, arising from local causes. 6. General disease (not febrile), with essential local complication.

The remainder of the diseases are distributed into ten chapters, as follows:—1. Diseases of the nervous system, 2. Diseases of the organs of circulation. 3. Diseases of the organs of respiration. 4. Diseases of the organs of digestion and abdominal viscera. 5. Diseases of the urinary organs. 6. Diseases of the organs of generation. 7. Diseases of the organs of sense. 8. Diseases of the skin and its appendages. 9. Parasitic animals; and 10. Poisons, followed by a list of antidotes to the principal poisons.

The Second Part is brought to a close by an extensive collection of Formulæ, preceded by classified lists of the preparations of the Pharmacopœia, with their doses.

Glossarial and general indices complete the volume.



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PART I.

GENERAL PATHOLOGY AND THERAPEUTICS.

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THE PHYSICIAN'S VADE MECUM.

CHAPTER I.

HEALTH AND DISEASE.

1. HEALTH admits neither of definition nor description; of none, at least, which can be applied to any useful purpose. If we define it as the integrity of every structure, and the perfect and harmonious play of every function, we give a true definition, but not a useful one. The more lengthened description in which some writers have indulged answers no better end, for it establishes no standard of comparison, and that is what we are in want of. Perfect health, like perfect beauty, is perhaps an ideal compounded of the perfections of many different individuals; or if it exist, it falls to the lot of few, and its phenomena have met with no accurate description.

2. In strict propriety of language, perhaps there is but one condition of the human body to which the term 'health' can be applied, all others being deviations, more or less wide, from that condition; but for practical purposes, it is well to understand that there may be very great and marked departures from an ideal standard of perfect health, to which, nevertheless, the terms disorder or disease would be inapplicable.

3. That health is a condition of body admitting of degrees, the use of such qualifying terms as '*good*,' '*perfect*,' '*strong*,' '*vigorous*,' '*robust*,' '*feeble*,' '*delicate*,' abundantly shows; and these differences of degree are very generally recognised, not only as belonging to the same person at different times, and at different periods of life, but also as serving to distinguish one individual from another.

4. But there are other differences between individuals which are recognisable by certain external peculiarities, and which ought to be understood, inasmuch as they indicate a tendency to particular diseases, or classes of disease, or to a peculiar character attaching to all the

diseases to which they may become subject. These differences have long been recognised under the name of *Temperaments*—a word necessarily wanting in precision, but, like many others in common use among medical men, embodying a useful generalization.

5. Four temperaments are generally recognised—the *sanguine*, the *phlegmatic*, the *bilious*, and the *nervous*.

6. The *sanguine* temperament is characterised by moderate plumpness of person and firmness of flesh. The hair is red or light chesnut, the eyes blue, the complexion fair and florid, and the skin soft and thin. The blood-vessels are large, the circulation active, and the pulse full and frequent. The countenance is animated, the movements quick, the passions excitable, the mind volatile and unsteady.

7. The *phlegmatic* or *lymphatic* temperament is distinguished by roundness of form and softness of the flesh. The hair is fair, the eyes light blue, gray, or hazel, the skin pale, the lips fleshy, and the face and person wanting in character and expression. The blood-vessels are small, the circulation languid, and the pulse infrequent. All the functions, bodily and mental, are torpid.

8. The *bilious* temperament is recognised by moderate fulness and much firmness of flesh, with harshly-expressed outlines of the person, strongly-marked features, and decided expression of countenance. The hair and eyes are dark brown or black, and the complexion swarthy. The vascular system is largely developed, and the superficial veins are unusually prominent. The pulse is full, firm, and of moderate frequency. There is much energy of character, with great power of endurance physical and mental, and permanence of impressions.

9. The *nervous* temperament is distinguished by a small spare form, with soft and slender muscles. The features are delicate, the hair fair, and the complexion pale or slightly tinged with red; the lips thin, and the eyes light and sparkling. The pulse is small, frequent, and quick, and easily excited by mental emotions or nervous impressions. The whole nervous system, including the brain, is active, the senses are acute, the thoughts and movements quick, and the imagination lively. The health of these persons is often feeble.

10. A *melancholic* temperament is sometimes spoken of. It is nearly allied to the bilious, and is marked by peculiar calmness and seriousness of mind, with great tenacity of impressions, and a tendency to indulge in gloomy thoughts.

11. Pure specimens of these temperaments are rarely met with. In the majority of individuals two, or even more, temperaments are found in combination, and these combinations are known as *mixed* or *compound* temperaments. Thus we may have a *nervous-lymphatic*, a *sanguine-nervous*, or a *sanguine-bilious* temperament, the nervous element preponderating in the first, and the sanguine element in the last two cases. In some instances the leading characteristics of the

two temperaments are so distinct, that we have no difficulty in recognising the union, but in a larger number of cases they are so blended that it is difficult to say which temperament predominates. It is also by no means unusual to encounter in the purest specimens of the several temperaments remarkable exceptions to the rule; for instance, a pulse of 50 in a youth with all the outward characters of the sanguine temperament.

12. Each of these temperaments is liable to a different class of diseases,—the sanguine, to acute inflammation and active hæmorrhage; the phlegmatic, to congestions and subacute inflammations, to glandular and tubercular diseases; the bilious, to disorders of the digestive organs, to hypochondriasis and melancholia; and the nervous, to disorders of the nervous system, and to mental derangement accompanied by excitement.

13. Among the peculiarities of form and appearance here enumerated as combining to constitute the temperaments, there are some which claim a greater share of attention as indications of natural strength or weakness, and of liability to diseases of a peculiar type or character. Thus, *cæteris paribus*, the large chest is an indication of vigour; the small chest, of weakness; the thin lip, marked features, and small joints, of tone; the full upper lip, rounded form and features, and large joints, of constitutional debility.

14. There are other combinations again which are found to prevail among persons subject to certain diseases or classes of disease, and these combinations have received the name of *Diatheses*. For instance, a fair complexion, fine hair of different shades from light to dark chesnut, a blue or gray eye, and long eyelashes, with a thick upper lip, form a combination very frequently met with in persons affected with scrofulous diseases; and the same combination, the thin upper lip being substituted for the thick, is as commonly met with in consumptive patients. The former may be termed the *strumous* or *scrofulous*, and the latter, the *phthisical* or *consumptive* diathesis. They are very closely allied, and are probably but slight modifications of one and the same diathesis.

15. The term *diathesis* is also in frequent use to designate the kind or character of constitution of persons in whom the urine habitually or frequently deposits certain chemical compounds. Hence the terms *oxalic acid*, *lithic acid*, and *phosphatic diathesis*, applied to persons whose urine yields oxalate of lime, lithic acid and its salts, and phosphoric acid and its salts, in excess, accompanied by certain peculiarities of system and departures from health.

16. These external differences which, under the names of temperament and diathesis, distinguish one man from another, are often transmitted from parent to child, and are then said to be due to *Hereditary Predisposition*.

17. That hereditary predisposition is a real and powerful influence may be inferred from the marked resemblance of most children to their parents or ancestors. Sometimes the resemblance extends to the reproduction of the very temperament or diathesis of one or other of the parents, coupled with a close resemblance of form and feature; but in most instances, the resemblance is less exact, and is limited to some strongly-marked feature; to some deformity; or to some peculiarity of taste, temper, or talent. Such peculiarities are sometimes transmitted through several generations. The resemblance which the members of the several royal families of Europe have to each other is a common subject of remark. In ancient Rome, the mildness and humanity of the Gracchi, the severity of the Catos, and the cruelty of the Claudian race; in France the factious rashness of the Guises, and the irritable and unbending character of the family of Mirabeau; and in England, the vigorous intellect of our Gregorys, Herschels, and Pitts, furnish examples of the transmission of virtues, vices, and talents. Supernumerary toes and fingers, and certain defects in the organs of generation, may be cited as instances of hereditary deformity.

18. Hereditary predispositions to disease are also of very common occurrence. The diseases which have been most frequently traced to this cause are scrofula, pulmonary consumption, gout, epilepsy, insanity, cancer, and asthma. Stone, gravel, and other urinary disorders, some cutaneous diseases, and hæmorrhoids may also be added to the list. On the other hand, a sound constitution, and a frame destined to last to a very advanced age, are blessings often handed down through several generations.

19. In extreme cases of hereditary predisposition, all or several of the children of a marriage have become subject, at or about the same age, to a particular infirmity, such as blindness, or have fallen victims to some fatal disorder, such as pulmonary consumption.

20. This fact in the history of certain families has been recognised in the form of a special liability to certain acute infectious maladies, such as typhoid fever, scarlatina, hooping-cough, measles, and diphtheria, attended by an equally special mortality. As the liability to these acute and fatal seizures shows itself not in any one epidemic, or in any one spot, but in different epidemics, at long intervals, and in places very remote from each other, it is reasonable to attribute it to some common character in the persons attacked, or, in other words, to *family constitution*.

21. Hereditary diseases, as distinguished from hereditary tendencies to disease, are of comparatively rare occurrence. Few children, for instance, are born with tubercles in the lungs.

22. A curious but well-ascertained phenomenon, connected with the subject of hereditary predisposition, is the disappearance of a peculiarity of form, character, or morbid tendency during one generation, to appear again in the next. This has been termed *Atavism*.

23. The hereditary diseases or predispositions to disease just referred to, may be transmitted to their offspring without any fault or imprudence on the part of the parents. But children are often born into the world of infirm constitution and prone to disease, in consequence of circumstances referable to the marriage of the parents, such as extreme youth or advanced age, great disparity of age, or too close alliance in blood.

24. The habitual state of health of the parents, or even their state of health at the time of conception, and that of the mother during pregnancy, may also determine the constitution of the offspring; and there is reason to believe that the syphilitic taint in a parent is a cause of debility and a source of disease to his offspring.

25. The facts just stated with respect to hereditary predisposition are confirmed and strengthened by observations on animals, which exhibit its effects not only in their outward form but also in their instincts and habits; and Dr. Brown-Séquard has even found that guinea-pigs are subject to epileptic seizures similar to those which had been artificially induced in the parent animal by certain injuries to the nervous centres.

26. Among the morbid conditions which have been by general consent traced to hereditary taint, the most important is *scrofula*. It consists in the formation and deposit of a peculiar solid material (to be more exactly described in a future chapter) in the glands of the neck, and of the mesentery, in the substance of the lungs, liver, and kidneys, in the membranes of the air-passages, intestines, brain, and spinal cord, which solid material may stir up inflammation and lead to important structural changes, and become the source of several lingering and wasting maladies. This morbid deposit appears to acknowledge as its principal cause a certain weakness and unsoundness of constitution, which, after giving rise to one disease in the parent, may show itself in his offspring in a variety of different forms. A man who has attained an advanced age after suffering all his life from epilepsy, may see his children afflicted one with scrofulous enlargements and ulcers of the neck, a second with *tabes mesenterica*, a third with pulmonary consumption, a fourth with white swellings of the joints and destruction of the bones of the spine, and a fifth with weakness or unsoundness of mind.

27. An important practical inference may be drawn from what has now been stated concerning temperaments, diatheses, and hereditary predispositions—namely, that we must expect to encounter at the bedside a vast variety of constitutions, and many different degrees of vigour, by which our treatment of disease must needs be influenced and modified. Hence it is an advantage to a patient to be treated by a medical man acquainted with his constitution; but this advantage is often estimated much too highly, and cannot compensate for even a moderate superiority in education, experience, or skill.

28. Temperament, diathesis, and hereditary predisposition, then, constitute the most marked differences between man and man; but there are other differences of more rare occurrence, and limited to comparatively few individuals, which are known as *Idiosyncrasies*.

29. There are three kinds of idiosyncrasies. The first consists in an extreme susceptibility, or the reverse, to the action of certain medicines. Some persons, for instance, are salivated by a single small dose of the mildest preparation of mercury, while others will resist a long-continued course of the same remedy in its strongest forms. The second kind of idiosyncrasy consists in the production of severe and almost poisonous effects by the most common articles of diet. Fish, fruit, vegetables, and meat, usually accounted perfectly wholesome, occasion, in some persons, marked disorder of the digestive organs, accompanied sometimes with painful cutaneous eruptions. The third class of idiosyncrasies consists in the inversion of the characteristic effects of medicines; as when opium acts as an aperient, and common Epsom salts as a narcotic. A class of mental idiosyncrasies might be added, consisting in strange preferences or aversions for objects usually deemed indifferent.

30. The differences arising from temperament, diathesis, hereditary predisposition, and idiosyncrasy, may exist between males or females of the same age; but other and very important differences depend upon sex and age.

31. *Sex*.—The constitution of men differs from that of women; and this difference is recognised in disease as well as in health. In the constitution of the male there is more tone and more strength, and in the structure of his body, more rigidity; and, as a natural consequence, he is more prone to inflammatory affections and active hæmorrhages; females, on the other hand, have more sensibility and excitability, and a more lax and delicate fibre, with a strong tendency to nervous affections and to diseases of an asthenic character. The functions of menstruation, parturition, and lactation, also exercise a marked influence upon the health of the female, especially in the production of nervous disorders.

32. The diseases of men, taken one with another, are of a more fatal character than those of women; and men are more liable to suffer from accident and violence, and yield in greater numbers to the temptation of intemperance. Hence the lower rate of mortality of females, their greater longevity, and the excess of women among the living population.

33. This difference in the mortality of males and females obtains at every period of life except the interval from 15 to 35 years of age, when the deaths of females are in excess of those of males, and the intervals from 5 to 10 and 35 to 45, when the numbers are equal; and it even shows itself in infancy when a difference of sex might be supposed to have the least influence. Male children under 5 years of

age die at the rate of 73 in the thousand, but female children at the lower rate of only 63 in the thousand.

34. The most important practical consideration connected with sex is, the greater liability of males to inflammatory and sthenic diseases, and of females to asthenic and nervous disorders; so that, as a general rule, if a male and female are attacked by the same disease, the former will bear depletion and lowering remedies better than the latter.

35. *Age*.—There are several important practical considerations connected with age. In reference to the period of infancy, we have to bear in mind the gradual, and often imperfect, establishment of the function of respiration, and the consequent necessity of external warmth; in early childhood the disturbance produced by teething; and throughout infancy and childhood, the liability to disorders of the stomach and bowels, on the one hand, and of the brain on the other. Diarrhœa, infantile fever, abdominal consumption, intestinal worms, and scrofulous affections of the absorbent glands, are the diseases resulting from the activity of the organs of digestion and assimilation; convulsions and water on the brain, from the large development and vascular condition of the brain. Inflammation of the lungs, often connected with the imperfect development of those organs, and the febrile exanthemata of which the attacks are partly traceable to the fact that the first exposure to their contagions must occur during these early periods of life, complete the list of the more frequent and fatal diseases of infancy and childhood.

36. As childhood passes into youth, the disorders of the alimentary canal not only become less frequent and less fatal, but they react less severely upon the brain and nervous system. Intestinal irritation ends less frequently in abdominal consumption and water on the brain; and in lieu of the formidable convulsions of infancy, we have to encounter the more curable involuntary movements of chorea.

37. Towards the period of puberty, the disproportion between the head and abdomen and the rest of the body has almost disappeared, and by the twenty-first year the growth is nearly complete, though the process of ossification is not yet finished. By the twenty-fifth year, or a little later, the body attains its full growth. In the interval between puberty and this period, disorders of the alimentary canal and of the nervous system are of rare occurrence, but idiopathic fever and inflammatory affections are frequent; and scrofula, which had previously shown itself in the form of enlarged glands of the neck, white swellings of the joints, and abdominal consumption, now assumes the shape of consumption of the lungs. In women, the disorders which depend on the imperfect establishment or suppression of the menstrual discharge are rife during this period. Of these, anæmia is the most common; but chorea and epilepsy, melancholia and instinctive mania, are occasionally to be traced to the same cause.

38. From the twenty-fifth to the forty-fifth or fiftieth year, the body remains nearly stationary, with the exception of an increasing disposition to corpulency. During the first part of this period, idiopathic fevers, inflammatory affections, and pulmonary consumption are rife; but towards the fiftieth year, congestion begins to take the place of inflammation, and apoplexy is henceforth a common and rapidly-increasing cause of death. In women, the interval from forty to fifty, with the years preceding and following, is marked by the cessation of the menstrual discharge, and the strange nervous affections which often accompany the change of life.

39. From fifty to sixty years, the body begins to show symptoms of loss of power and sluggishness of function, the prelude to that slow decay of which the progress is indicated by diminished sensibility, impaired memory, muscular weakness, scanty secretions, calculous affections, osseous deposits, organic diseases of the principal viscera, and malignant degenerations.

40. From this enumeration of the prevalent diseases of different periods of life, it will naturally be inferred, that the risks to which persons of different ages are exposed, as measured by their mortality, differ very considerably; to what extent the following statement will show:—The period most fatal to life is the first year, during which no less than one-fourth of all the recorded deaths takes place. During the four succeeding years, also, the number of deaths is so considerable, that the 25 per cent. of the first year becomes for the first five years 42 per cent. By the completion of the fifteenth year, this proportion is increased to nearly one-half of the whole number of deaths. During the forty years which elapse from the age of 15 to the age of 55, rather more than a fourth part of all the deaths takes place, each decade contributing in nearly equal proportions to the aggregate result. By the end of the fifty-fifth year, three-fourths of the population have succumbed. From 55 to 85, an aggregate of 23 deaths in the hundred, or nearly another fourth, takes place; the ten years from 65 to 75 being the period of the greatest number of deaths. Two per cent. of the entire mortality remains to be accounted for by the deaths which take place after 85 years of age. A small number of healthy and vigorous persons of either sex, reach, or even surpass, the age of 100, and a still smaller number are believed to have attained or exceeded a century and a half.

41. The following is a condensed view of the distribution of the deaths according to age:—

Under 1 year	25 deaths in 100.		
„ 5 years	42	„	„
„ 15	49	„	„
„ 55	75	„	„

DEATHS AT DIFFERENT AGES—IN MALES AND FEMALES. 9

Or, if the whole mortality is distributed into four equal parts, it will take place in unequal times, thus:—

Under 1 year . . .	one-fourth.
1 to 15 (14 years) . . .	one-fourth.
15 to 55 (40 years) . . .	one-fourth.
55 and upwards . . .	one-fourth.

42. These figures relate to the number of deaths registered at the several ages; but as the number of persons living at each age differs very widely, they do not display the true risk to which persons of different ages are subject. This is shown in the following table, in which (as a different rate of mortality prevails in the two sexes) males are distinguished from females.

Out of 1000 males and 1000 females living at each of the ages specified in the table, the number of deaths placed opposite to those ages occurs, one year with another, among the English population—

Ages.	Males.	Females.
Under 5	74	63
5 to 10	9	9
10 „ 15	7	5
5 „ 15	7	7
15 „ 25	8	9
25 „ 35	10	11
35 „ 45	13	13
45 „ 55	19	16
55 „ 65	32	29
65 „ 75	68	61
75 „ 85	150	137
85 „ 95	303	281
95 and upwards	452	452

43. The column of figures which represents the rate of mortality of females shows a curious approach to regularity of increase in the five decades from 5 to 55, and in the six decades from 45 to the end of life; the mortality in the first series of decades being nearly as the numbers 7, 9, 11, 13, 15, while that in the last series is not very remote from the series 15, 30, 60, 120, 240, 480. It may therefore be stated, as a rough approximation to the truth, that from the fifth to the fifty-fifth year the rate of mortality increases by about 2 in the 1000 every ten years; and that after the forty-fifth year the rate of mortality doubles every ten years. It may be well to repeat that this general statement is less strictly accurate in the case of males than it is even in the case of females.

44. It is important to understand that between persons of the same sex and age there are very appreciable differences: that, in other words, the same age does not represent the same degree of growth, or the same perfection of function. These differences are well illustrated in the female by the variable time of occurrence of certain constitutional

changes characterised by the appearance or suppression of the menstrual discharge. Observations on a very extended scale have shown that while the most usual age for the first appearance of the menses is the fifteenth year, that event may happen at any age from eight years to twenty-five. In very rare instances it has occurred earlier than the eighth year, and even in the very first year of life. So also with the period of suppression of that discharge. It may disappear at any age from thirty-five years, or even earlier, to fifty-six years, or later; and it may recur at very advanced periods of life.

45. Another very important consideration in regard to age relates to the fatality of the same diseases at different periods of life. As age advances, the structures of the body undergo changes which render them more and more prone to disease, at the same time that they lose the power which they possess in so great a degree in early life, of self-restoration. Hence the great simplicity of the diseases of childhood, and the success attendant upon their treatment, when compared with those of more advanced periods of life.

46. This general principle is well illustrated by the special case of the mortality from fever at different ages. It is well known that, in the majority of cases, fever proves fatal by setting up inflammation in some important organ of the body, as the lungs, the bowels, or the brain. The mortality from fever may therefore be expected to keep pace with, and to be a measure of, the liability of the several organs of the body to fall into a state of disease, and to increase as the power of self-restoration diminishes; and the calculations founded by Mr. Finlaison on the experience of the London Fever Hospital fully confirm this expectation. If we suppose 100,000 patients to be attacked with fever, at each of the ages specified in the following table, the mortality will be represented by the figures in the column of deaths:—

Age.	Deaths.
5 to 16	8,266
15 „ 26	11,494
25 „ 36	17,071
35 „ 46	21,960
45 „ 56	30,493
55 „ 66	40,708
66 and upwards . . .	44,643

The risk to life from fever is therefore more than twice as great at 30 as at 10; nearly twice as great at 40 as at 20, and at 60 as at 40; it is nearly five times as great at 60 as at 10, and nearly four times as great above 65 as at 20. Similar results have been obtained for the febrile exanthemata, which, like fever, originally affect the whole body, but in their progress attack individual organs; and for dysentery as it attacks our troops in unhealthy stations, or under unwholesome circumstances, abroad.

47. The liability to sickness, and the duration of it when it occurs,

also increase with age. This is shown in the following table, which is altered from a valuable abstract, by Mr. Neison, of the results of a large number of returns from English and Scotch Benefit Societies.

Age.	Per Centage of Members Sick during each Year.	Sickness per Annum among those actually Sick, expressed in Weeks.	Mortality per Cent. among those actually Sick.
11—15	21·9	4·1	1·0
21—25	22·0	3·8	3·1
31—35	21·0	4·4	3·8
41—45	23·0	5·9	4·5
51—55	27·6	8·5	6·2
61—65	35·6	15·2	8·6
71—75	58·4	32·3	12·1
81—85	74·5	37·8	18·4

48. The differences occasioned by temperament, diathesis, hereditary predisposition, sex, and age, are still further extended and exaggerated by *Climate, Place of Abode, Occupation, Habits, and Mode of Life*. Some of these influences demand especial notice, in consequence of their bearing upon practice.

49. The most powerful of these influences is the atmosphere, which not only affects the entire surface of the body by variations in its temperature, pressure, moisture, and electric condition, but, by its contact with the skin and internal surface of the lungs, produces the most important chemical changes in the blood, and through it in the system at large. A variety of subtle poisons, of which some are eliminated from inorganic matter, others generated by animal and vegetable decomposition, and a third class given off from diseased living bodies, are also held in suspension in the air. All of these, in a state of concentration, may give rise to fatal accidents, or to severe diseases; but when diffused in smaller quantity through the air, they modify the state of health, and impair the tone of the system. Other substances—such as smoke, dust, and metallic particles, given off during certain chemical or mechanical operations—also tend to impair the functions of the skin and lungs, and may become the source of fatal maladies.

50. The temperature, moisture, pressure, and electric condition of the air, variously modified and blended by situation, soil, and the physical conformation of the surrounding country, constitute *climate*, of which the prolonged effect upon the frame is seen in the form and features, as well as in the condition of the several functions of the body. Some of these conditions of the atmosphere are deserving of a separate notice, as having a marked influence upon health.

51. The *temperature* of the air is by far the most important; for it

results from actual observation on the large scale that in temperate climates, the amount of sickness among a population increases as the temperature rises, while the mortality is greatest when the temperature falls to the lowest point. A hot summer is therefore very sickly, and a cold winter very fatal to life. The less mortal sicknesses of summer prevail in the shape of diarrhœa, cholera, dysentery, and febrile affections, among the young and middle aged; the more mortal maladies of winter in that of pneumonia and bronchitis among infants and aged persons. As a high temperature promotes putrefaction and decay, it is obviously favourable to diseases dependent upon atmospheric impurity. This circumstance accounts for the fact, that in former times, when our towns were in a much more filthy state than they are now, sickness and mortality were both at their height in summer; and one result of the improved sanitary state of our crowded population is to shift the maximum mortality from the summer to the winter months.

52. The facts which have been ascertained respecting the influence of temperature on the occurrence of fatal maladies admit of being briefly stated. If we divide the year, in the usual manner, into four equal quarters of three months each, we obtain, for England, the following results:—

1. January, February, March	25 deaths per 1000.
2. April, May, June	22 " "
3. July, August, September	20 " "
4. October, November, December	21 " "

53. If the twelve months are so grouped as to correspond more closely with the four seasons of the year, the mortality, for London, is represented approximately by the following figures:—

Winter (December, January, February)	16 deaths.
Autumn (September, October, November)	15 "
Summer (June, July, August)	14 "
Spring (March, April, May)	14 "

54. If a still better distribution of the twelve months is made, into the four hottest, four coldest, and four temperate months, we have, for London, the following numerical proportions:—

Four coldest months (Dec., Jan., Feb., March)	21 deaths.
Four hottest months (June, July, Aug., Sept.)	19 "
Four temperate months (April, May, Oct., Nov.)	18 "

So that, in whatever way the months of the year are grouped, the coldest months are most fatal to life; while, as appears from the last comparison, the aggregate of hot months ranks next in order of fatality, the months of intermediate temperature being the least fatal.

55. The effect of a low temperature in destroying life is strikingly shown by a comparison made in one of the Reports of the Registrar-

General between the deaths in ten consecutive cold days in the months of November and December, 1856, and ten warmer days preceding and following them. The ten cold days had a mean daily temperature of 34° , and a mean nightly temperature of 27° ; and the ten warmer days a mean daily temperature of 51° , and a mean nightly temperature of 47° . In the ten colder days there died of consumption 232, of bronchitis, pneumonia, and other diseases of the lungs 502, of diseases of the heart 73, of diseases of the brain 170, and of other diseases 867. In the ten warmer days, the deaths by the same diseases, in the same order, were 163, 394, 51, 172, and 725. In consumption, bronchitis, and other diseases of the lungs, and in heart-disease, therefore, a fall of about 28 degrees of temperature gave an excess of deaths in the ratio of 23 to 16, 50 to 39, and 73 to 51. If all causes of death are taken together, the deaths in the colder are to the deaths in the warmer days as 18 to 15.

56. The influence of temperature in promoting disease and undermining health is most distinctly displayed in the diseases which attack the inhabitants of temperate climates when residing in countries strongly contrasted with their own.

57. The different temperatures which prevail in different parts of the world are believed to contribute largely to the observed variations in the diseases to which the native populations are liable. The countries within the tropics, or bordering upon them, are scourged by intermittent and remittent fevers of the most severe and intractable types, by yellow fever, by diarrhœa, dysentery, and cholera, and by diseases of the liver; while the countries verging on the North Pole are especially subject to catarrhal affections, to influenza, to diseases of the organs of respiration, and to scurvy; and the countries in the temperate zone, between the tropical and polar zones, to fevers of the continued type, to typhus and typhoid fevers, with intermittent and remittent fevers of a more tractable character, to pulmonary consumption, to rheumatism, and to eutaneous diseases of great variety of character, and often of great severity.

58. The diseases most prevalent in the several regions of the globe also prevail in countries which share with them a similar temperature; so that isothermal lines, or lines of equal temperature, are lines of disease also. The diseases, for instance, which have been pointed out as incident to countries in or near the tropics prevail along the equator of heat, or mean annual isothermal line of 82.4° Fahr.; and in and near all that zone or region which is bounded north and south by the isothermal line of 68° ; while the diseases of the temperate zone occur in the countries lying on or near the isothermal lines of 50° ; and those of the polar zone or region on or near the isothermal line of 41° . It may be useful to trace the course of these three isothermal lines, and to mention the countries or cities which they traverse or touch—

(1.) The isothermal line of maximum temperature, or equator of

heat, traverses or passes near the southern coast of the Gulf of Mexico, the Gulf of Guinea, the Straits of Bab-el Mandel, and the fortress of Adeu, the southern point of Hindostau and the city of Madras, and the islands of Sumatra and Java.

(2.) The northern isothermal line of 68° traverses California, skirts the north coast of the Gulf of Mexico, touches the island of Madeira, the fortress of Gibraltar and the city of Algiers, runs along the south coast of the Mediterranean, and passes through China at the latitude of Nankin.

(3.) The southern isothermal line of 68° traverses South America, from Potosi to Santa Fé, touches the Cape of Good Hope, and cuts off all that southern portion of Australia which has become the home of English colonists.

(4.) The northern isothermal line of 50° touches New York and the southern point of Ireland, traverses the northern coast of the Black Sea, the Caspian, and the Sea of Aral, and passes between the northern and southern islands of Japan.

(5.) The southern isothermal line of 50° traverses the southern point of South America, runs north of the Falkland Islands and south of Vau Diemeu's Land, and cuts off the southern angle of New Zealand.

(6.) The isothermal line of 41° touches Quebec, the south coast of Iceland, Stockholm, and Moscow, cuts in half the northern island of Japan, and runs south of the peninsula of Kamtschatka.

59. This brief sketch of some of the chief points of the earth's surface touched by lines of equal temperature may serve to direct attention to the influence of the important element of heat in the production of disease. It must, however, be borne in mind that the diseases mentioned as specially incident to the several zones may pass beyond the limits thus roughly assigned, whenever, from local causes, the temperature is raised or lowered, or when, the mean annual temperature being little raised or lowered, the summer is unusually hot or the winter unusually cold. In the one case, the diseases of the temperate zone may assume the character usually belonging to the diseases of the tropical zone; in the other, they may approximate more closely to those which prevail among nations living nearer to the pole.

60. It must also not be forgotten that the diseases mentioned as prevailing in the several zones are not wholly due to temperature. Thus scurvy, which is a very prevalent and fatal disorder in countries situate in the polar zone, may be traced in part to cold, and in part to the imperfect diet which the cold itself is the means of imposing upon the inhabitants; and it is well known that a diet deficient in vegetables may occasion scurvy in any part of the world. Again, the severe and fatal diseases of the tropical zone are not traceable solely to a high temperature, but to heat acting upon and developing the miasma of damp and rank soils. Hence, troops and bodies of men, encamped on dry spots in the most unhealthy tropical districts, may escape, to a great extent, the prevailing maladies. By the discovery

and use of such spots alone can the inhabitants of temperate climates hope to maintain their hold on their possessions in countries having a much higher temperature than their own.

61. The influence of *moisture*, as distinguished from that of the poisonous emanations from the soil which it promotes, is not so readily traced as that of temperature. There is reason, however, to believe that the inhabitants of damp soils and low-lying districts have less vigour than those who inhabit gravelly and sandy soils and the summits of hills and mountains. Experience also proves that many invalids suffer most when the air is loaded with moisture.

62. It is a notorious fact, however, that excessive humidity generally coexists with a high temperature in climates and regions most fatal to human life; as on the southern coast of Africa, the Sunderbunds of Bengal, and the deltas of rivers, marshy spots, and jungles, at all seasons within and near the tropics, and in more temperate regions during the heats of summer.

63. *Atmospheric pressure* also has its effect upon health, and many invalids are susceptible even of slight changes in this respect. The oppression experienced in the diving-bell, the diarrhoea incident to those who remove to residences in very lofty situations, and the hurried respiration, quickened circulation, and tendency to hæmorrhage which accompany the ascent of high mountains, are illustrations of the more extreme effects of increased or diminished atmospheric pressure.

64. The influence on health of the *electric condition* of the air has not yet been clearly made out. The very small quantity of electricity which has more than once been detected in the atmosphere of places in which the Asiatic cholera was raging, is one of the most remarkable coincidences yet discovered.

65. It has also been shown that the quantity of *ozone* (a modification of oxygen occasioned by repeated electrical discharges, and characterised by a peculiar penetrating odour and an increased power of oxidation) bears a striking relation to the prevalence of certain diseases, having been observed to be in defect during the prevalence of intermittent fever and of cholera, and in excess during at least one epidemic of influenza.

66. But in addition to the more obvious and appreciable atmospheric changes, there are others which are known to us only by their effects. The Asiatic cholera, for instance, has in the experience of the present generation, on three occasions overstepped its usual limits, and spread over the greater part of the habitable globe; and the entire class of infectious and contagious maladies exhibits variations in intensity from year to year which cannot be explained by differences of atmospheric temperature, moisture, and pressure, nor even by variations in the electric condition of the air, and in the proportion of ozone.

We are obliged, therefore, to believe in the existence of those obscure modifications in the state of the atmosphere, which are known as '*Epidemic Constitutions.*'

67. Although we cannot describe or explain these atmospheric conditions, we are able to form some idea of the amount of the influence which they exert, by noting the annual fluctuations in the number of deaths due to infectious and contagious diseases, such as small-pox, measles, scarlet fever, and typhus fever. Thus, in the fifteen years from 1840 to 1854 inclusive, the annual number of deaths from small-pox taking place in London, in a million of inhabitants, was as low as 87, and as high as 890; from measles, as low as 249, and as high as 1122; from scarlet fever, as low as 354, and as high as 2132; from hooping-cough, as low as 582, and as high as 1217; from influenza, as low as 35, and as high as 562; from erysipelas, as low as 113, and as high as 260; and from typhus and typhoid fever, as low as 615, and as high as 1600.

68. The extent of these variations will appear the more remarkable when they are contrasted with the very slight differences in the annual rate of mortality of many other diseases, especially those which depend primarily upon structural changes. The deaths from pulmonary consumption, for instance, in the same years and among the same number of persons, fluctuated between the numbers 2645 and 3941; from inflammation of the lungs, between 1340 and 2169; from cancer, between 253 and 432; and from apoplexy, between 426 and 607.

69. A still more vivid idea is afforded of the extent of these fluctuations by the fact, that no combination of causes within or beyond human control gives rise to such considerable annual variations. Neither the weather, nor the number of shipwrecks, nor the imports and exports of commodities, nor the prices of food, nor the quotations of the funds, are subject to such fluctuations from year to year.

70. It is also well worthy of remark that these peculiar states of atmosphere, whatever they may be, do not affect all diseases of an infectious or contagious nature in the same degree; for the smallest number of deaths from small-pox, from erysipelas, and from measles, and the largest number of deaths from small-pox and from influenza, occurred in years in which no other of the diseases just mentioned attained their highest or lowest numbers; while the least number of deaths from influenza coincided with the greatest number from measles; and the least number from typhus fever with the greatest number from hooping-cough. On the other hand, the least number of deaths from scarlet fever and typhus coincided in the year 1841, and the greatest number of deaths from scarlet fever, typhus fever, and erysipelas in 1848. But the epidemic visitations of cholera occurred in years marked by no peculiar excess or defect of any of the diseases of which mention has just been made.

71. The *contamination of the air* is a most efficient cause of modi-

fications in the state of health, as well as a prolific source of disease. The pure air of rural districts is subject to contamination by the exhalations from stagnant pools and marshes, which, when they do not produce actual disease, have a morbid influence on the general health of the inhabitants. But the air of large towns is subject to still greater pollution by the gases given off from the body itself, the decomposition of animal and vegetable substances, the refuse of manufactories, the smoke resulting from the imperfect combustion of fuel, and the dust created by constant traffic.

72. These impurities in the air of large towns, existing both within and without the dwellings of their inhabitants, tend to modify the state of health of those who are reputed healthy, and to render them liable to a class of diseases distinguished from those of rural districts by an absence of power or tone, no less than by the different and even opposite treatment which they require. Thus a disease, which in the country will bear and perhaps require bloodletting, will, in large towns, scarcely admit of any amount of depletion, and may even demand an opposite mode of treatment. This depressing and debilitating effect of the atmosphere of large towns, displayed in the pallid aspect of those who are esteemed healthy, and in the want of power accompanying the diseases to which they are subject, is a fact of great practical importance, which ought always to be borne in mind at the bedside.

73. The debilitating effect of a residence in large towns is most apparent in that class of the inhabitants which follows its employments within doors, and which, in addition to the impure air of the town itself, is exposed to the close and heated atmosphere of shops and workshops, often combined with an absence of the wholesome stimulus of light. These persons exhibit, in an exaggerated form, the peculiar influence of a town life, and their diseases are marked in a still greater degree by want of power. There is as much difference between the indoor and outdoor labourers of large towns as there is between the inhabitants of town and country. A difference of a less marked kind is also to be observed between those who lead a sedentary life within doors, and those whose indoor employments require a greater amount of exertion.

74. A residence in large towns, then, tends to reduce the strength and vigour of the frame, and predisposes to diseases characterised by want of tone and power; and this effect is more marked in persons employed within doors than in those working in the open air, and in the sedentary than in those using greater exertion.

75. In the case of many of the inhabitants of large towns who follow indoor employments, another depressing and exhausting influence is often superadded to those just enumerated, viz., long hours of work or service, often extending far into the night, and sometimes usurping almost all the time which ought to be devoted to sleep. The London bakers during the whole of the year, compositors during the session of

Parliament, and milliners and dressmakers during the fashionable season, suffer greatly from this cause.

76. The injurious effects of the polluted atmosphere of large towns may be inferred from the excessive mortality of their inhabitants as compared with that of rural districts. Thus, while the annual mortality of rural districts in England and Wales varies from 18 to 22 in the thousand, that of town districts, not being the seats of manufacture, will often amount to 25 in the thousand; and that of populous manufacturing towns and crowded sea-ports to 35 in the thousand, or even more. The mortality in some continental capitals exceeds 40 in the thousand. The very highest of these rates of mortality is exceeded in certain unhealthy districts of almost all our large towns.

77. These figures present, it is true, a somewhat exaggerated view of the case, inasmuch as the known difference in the ages of civic and rural populations is left out of the calculation. When this necessary element of the ages of the living population is taken into account, these differences in the longevity of the inhabitants of town and country, and of the best and worst districts of the same town, are brought within much narrower limits.

78. It must not, however, be supposed that the rural districts enjoy an absolute immunity from the causes which impair the vigour and shorten the lives of the inhabitants of towns. Defective drainage and natural obstacles to the free movement of the external air often combine with overcrowding and neglect of cleanliness within doors, and a scanty and unwholesome diet, to counteract the beneficial influence of wholesome labour in the pure open air of the country, and so impair the strength as to predispose to diseases of the low type prevalent in crowded city populations. Overwork, also, is not an evil limited to town populations.

79. It should also be borne in mind that many country places share, with the least healthy portions of our large towns, the evil of a rich and ill-drained soil. Many a small village or isolated house in the country, like the southern district of London, or the old town of Liverpool, stands on a swamp between a river or stream and a range of hills or rising ground; and invites a visit from every pestilence that happens to prevail.

80. The diseases which cause the high mortality of town populations are, in accordance with what has been just stated, the scrofulous affections of children, and the pulmonary consumption of the adult, together with febrile diseases and exanthemata characterised by an unusual tendency to the typhoid or adynamic form. The dust and smoke suspended in the air of large towns also give rise to diseases in the lungs, which exist in their most severe and fatal form among the scythe, knife, and needle grinders of Sheffield.

81. Next to impure air, as a cause of diminished health and vigour, comes scanty or unwholesome food. Insufficient nourishment is one of

the chief causes of that want of power and tone which has been pointed out as marking the inhabitants of large towns, and of some of the least favoured of our rural districts. In infancy and childhood, again, a diet not merely unequal to the wants of the frame, but unsuitable to the age, or destitute of some essential element of the growth of the body, often sows the seeds of future weakness and disease. At all ages, too, the poorer part of the population either consume unwholesome food, or live on a diet wanting in the requisite variety of elements. Hence land scurvy and other allied diseases. Hence also, in earlier periods of our history, that scorbutic state of the mass of the population, which, co-operating with such pestilences as plague, continued fever, and small-pox, gave rise to a destruction of human life of which we have happily no experience in the worst epidemics of this century.

82. A still more fatal cause of weakness and disease is the abuse of spirituous liquors, to which the inhabitants of large towns are peculiarly addicted. Its effect on health is seen in the pallid and sodden aspect of the drunkard; its influence on the character and course of disease in the fatal effects so often attending the slightest injuries in brewers' draymen and other intemperate persons; and its agency in shortening life by facts which it may be well to state somewhat in detail.

83. It has been ascertained that in men peculiarly exposed to the temptation of drinking, the mortality before thirty-five years of age is twice as great as in men following similar occupations, but less liable to fall into this fatal habit. It has also been shown that the rate of mortality among persons addicted to intemperance is more than three times as great as in the population at large. At the earlier periods of life the disproportion is still greater, being five times as great between 20 and 30 years of age, and four times as great between 30 and 50. The annual destruction of life among persons of decidedly intemperate habits has been estimated at upwards of 3000 males and nearly 700 females, in a population of nearly 54,000 males and upwards of 11,000 females addicted to intemperance. Most of these deaths are due to delirium tremens and disease of the brain, and to dropsical affections supervening on disease of the liver and kidneys.

84. This extensive prevalence of intemperance among the English population should be borne in mind, especially as no fact is better established than that diseases occurring in constitutions impaired by excess require a peculiar treatment. Intemperate persons not only bear depletion worse than other inhabitants of large towns, but they even require the opposite mode of treatment.

85. Luxury, too, like intemperance, tends to undermine health and shorten life. Hence the higher orders are short-lived, and, we may therefore safely infer, unhealthy while they live. Our agricultural labourers, in spite of the many disadvantages to which they are exposed, are much longer lived than any of the higher classes; and the aristo-

cracy are nearly on a par with the members of benefit societies in Liverpool, the unhealthiest city in England. Of the classes, too, which enjoy the most ample means of self-indulgence, those are the most unhealthy which possess those means to the greatest extent. Thus the gentry are more healthy than the aristocracy; the aristocracy, than the members of royal houses; and these last more healthy than crowned heads. Those who occupy the highest place in the social scale are probably, in point of health and longevity, but little raised above the very meanest of their subjects.

86. With the exception of the hardships to which the very poorest and most destitute members of society are exposed, there is no more fruitful source of disease than inactivity of mind and body. In wealthy communities the number of persons who have no occupation of sufficient importance to interest and occupy the mind is always very great; and such persons constitute a large proportion of the class of habitual invalids.

87. But while the unfortunate possession of wealth unpurchased by exertion tempts young men to sloth, luxury, and dissipation, and older men to less active self-indulgence, poverty exposes other classes of the community to similar evils. Thus the soldier, in time of peace, suffers from the *ennui* of insufficient employment, is strongly tempted to indulge in dissipation, and is exposed, at the same time, to the evils of overcrowded and unwholesome barracks; and with him, too, disease is busy and life short. Confinement, and the absence of such employment as is calculated to interest and excite the mind, also undermine the health of the prisoner, whose position, in other respects, is so much superior to that of the soldier, and of the pauper, who shares with him some of the evils of overcrowding and defective sanitary arrangements. Recent inquiries have proved that the life of the soldier in time of peace is greatly shortened by the causes now specified; the prisoner is also known to suffer thereby; and it is also highly probable that for every life which poor-laws save by averting starvation, a hundred are sacrificed by the imprisonment they inflict.

88. The enumeration of the causes of the wide differences existing between individuals reputed healthy, or not actually suffering from some well-defined malady, would be incomplete if no notice were taken of that strange and inexplicable change that is wrought in the body by contagious or infectious maladies, and especially by the febrile exanthemata, which change consists in a complete immunity from, or greatly diminished liability to, a second attack of those diseases. A similar result is brought about in one instance by a disease nearly allied to, but not identical with, the disorder from which the body is protected. The instance in question is the disease set up by vaccination as a preventive of small-pox.

89. The general result of the foregoing considerations respecting health, and the differences that exist between one individual and another, may be thus summed up:—There are many original and

many acquired differences between man and man. The original differences are those conveyed by the terms temperament, diathesis, hereditary predisposition, and idiosyncrasy; to which we may add those dependent upon sex and age. The acquired differences are due to climate, place of abode, diet, employment, and mode of life; and, in certain instances, to diseases previously undergone.

90. When, therefore, we take into consideration the original and acquired differences which distinguish man from man, and the various and complicated influences to which the body is exposed in all states of society, but especially in highly-civilized communities, no additional argument will be necessary to establish the first great principle on which much of the practice of medicine hinges—*that in health, and (by natural inference) in disease, every function of the body varies in different persons within wide limits of intensity.* This fact is the key to the imperfection of medicine as a science and its difficulty as an art.

91. DISEASE.—To define disease we must first have defined health, for the one is but the negation of the other. In like manner, the description and right understanding of disease depend upon the description and right understanding of health. Without attempting a formal definition, it will suffice to state, that disease is present when any structure of the body is changed (provided that change be not the direct and immediate effect of external injury), or when any function is either unnaturally active, or torpid, or altered in character.

92. There is one distinction of great practical importance which may be properly insisted upon in this place: it is a distinction between disease, structural or functional, and those unhealthy *states of system* which are brought about by the prolonged operation of the causes enumerated in § 71–87. Previous to becoming the subject of any well-defined disease, the constitution may have been brought, by the continued action of one or more of these causes, into a state which shall cause the disease itself to assume a more or less severe form, and even to depart in some respects from its usual character and course. Much of our success in practice will depend upon our recognising these *states of system*, as well as the several individual peculiarities already pointed out, as modifying the disease which is under treatment.

93. Diseases vary much (*a*) in their nature; (*b*) in their form or type; (*c*) in their duration and course; (*d*) in their terminations; (*e*) in their causes; and (*f*) in their mode of occurrence.

(*a*) *Structural*.—Consisting in some alteration of structure.

Functional.—Consisting in disordered function.

Common.—Presenting the more usual characters of common inflammation, &c.

Specific.—Peculiar, or departing from the common character. Thus, syphilis and scrofula are specific diseases.

Malignant.—Structural diseases for which no remedy has yet been discovered, and which spread from texture to texture: as cancer.

Also diseases which assume a very dangerous and intractable character ; as malignant cholera, malignant typhus, malignant scarlet fever.

Idiopathic.—Not dependent upon any other disease.

Symptomatic.—Dependent upon, or being a symptom of, some other disease ; as dropsy following disease of the heart, liver, or kidneys.

Primary.—The first in a succession of diseased conditions ; for instance, a primary venereal sore.

Secondary.—Following after or upon some other disease : for instance, secondary syphilis.

94. (b) *Continued*.—Running their course without interruption in their symptoms.

Intermittent or Periodical.—Interrupted by intervals of health.

Remittent.—Having an alternate augmentation and diminution, but no complete cessation of their symptoms.

95. (c) *Acute*.—Of short duration and great severity.

Chronic.—Of long duration and slight severity.

These may be combined, as in intermittent fever, which is *chronic* in duration and *acute* in severity. Again, one may run into the other, the acute subsiding into the chronic, and the chronic being heightened into the acute. In one instance, the terms *acute* and *chronic* have been incorrectly used to mark merely the severity of disease ; thus articular rheumatism or rheumatic fever is called *acute* rheumatism, and rheumatism of the muscles is called *chronic* rheumatism.

Sthenic.—Marked by vigour and excitement ; nearly synonymous with acute.

Asthenic.—Characterised by want of vigour, and nearly synonymous with the words *typhoid* and *adynamic*.

96. (d) Most diseases terminate in complete recovery ; a considerable number in partial or incomplete recovery ; and one attack of illness in each person fatally.

Recovery from disease, even when complete, is generally gradual, and the time occupied by it is termed the period of *convalescence* ; but in certain cases the transition from disease to health is rapid and even sudden.

The diseases from which the recovery is slow, are mostly those which exhaust the patient's strength by the severity of their attack, and their long duration ; such as fevers, acute inflammations, exhausting discharges, and paralytic affections. The diseases from which recovery is sudden or rapid are chiefly neuralgic affections, and diseases dependent upon mechanical causes, such as calculi in the gall-duct or ureter.

Sometimes diseases terminate by profuse discharges, eruptions, or external inflammations, giving instantaneous or speedy relief. Such terminations are termed *critical*, or they are called *crises*. Observation, both in ancient and modern times, seems also to have proved the existence of *critical days*, that is to say, of days upon which febrile disorders are prone to take a favourable turn.

Diseases may also terminate in *relapse* (a common event in one form of continued fever); by *metastasis*, or transference from the part first attacked to some other part, as from the joints to the stomach, heart, or brain, in gout; or by extension of the morbid state to a texture similar to the one originally attacked, as is the case when acute rheumatism having commenced in the fibrous textures surrounding the large joints, seizes upon the fibrous textures in and about the heart.

97 (e) *Contagious and Infectious*.—Both these terms are now used to designate diseases communicated from one person to another; but the first means “communicated by contact,” the second, “conveyed through the air without contact.”

Hereditary.—Transmitted from parent or ancestor to offspring or descendant.

98. The causes of disease may be divided into *external* and *internal*. The first class comprises mechanical injuries; chemical agents applied to the body, inhaled, or swallowed; heat and cold. The chief internal causes are unwholesome and defective diet; great bodily exertion; intense and prolonged mental application, violent emotions, and depressing passions; dissipation and sexual excesses; increased or suppressed evacuations, and structural changes brought about by the slow operation of natural agents on a system predisposed to them.

99. (f) *Epidemic*.—Attacking a number of persons at the same time, and recurring at irregular intervals; as fever and small-pox. Some of these diseases, as cholera and influenza, spread from place to place with great rapidity, and attack at or about the same time the inhabitants of whole continents.

Endemic.—Peculiar to certain localities, as ague, goitre, elephantiasis, &c. The same disease may be both epidemic and endemic: thus, typhoid fever, which is endemic in certain districts of large towns, becomes epidemic in those districts in certain seasons or years; cholera again is endemic in India and epidemic in Europe.

Sporadic.—Attacking one individual at a time. In this sense the term is sometimes applied to epidemic and endemic diseases when they attack one or two persons only, in which case they are said to occur *sporadically*. Such sporadic attacks are common at the beginning and at the end of epidemics.

Zymotic.—This term, derived from a Greek word signifying ferment, is now used to characterise the entire class of epidemic, endemic, and contagious diseases. It is convenient as grouping together diseases allied to each other by the similarity of their predisposing causes, but objectionable as based upon a mere hypothesis which is obviously inapplicable to the cases of sudden death due to the operation of atmospheric and other poisons.

100. *Names of Diseases*. (Medical nomenclature).—No uniform plan has hitherto been pursued in giving names to diseases. The greater

number have been named from some prominent symptom, as fever (from *ferveo*, to burn), hydrophobia, diabetes. Other diseases have been named from their seat and nature combined, as hydrocephalus, water on the brain; or the seat is indicated by the root and the nature of the disease by a common termination. Thus the words pericarditis, pleuritis, iritis, mean inflammation of the pericardium, of the pleura, of the iris. Here the termination *itis* denotes the nature of the disease, viz., inflammation. Recent attempts have also been made to substitute for words in common use terms descriptive of the nature of the disease; as *hyperæmia* (excess of blood), qualified by the words general, local, active, and passive, for plethora, inflammation, and congestion; and *anæmia*, similarly qualified, for chlorosis.

101. *Classification of Diseases.* (Nosology.)—Almost all the systems hitherto proposed have rested upon some theory, which is now disallowed, and they have been attended with the usual inconvenience of all hasty and premature generalization—the inconvenience of associating dissimilar things, and separating those which are closely and naturally allied. For those who are engaged in learning, teaching, or practising medicine, that arrangement is the best which classifies diseases according to their nature, when that is sufficiently ascertained, and in other cases according to the part of the body which they attack. But for purposes of public utility that nosological system is to be preferred which places most prominently before the public, as a distinct class, the diseases admitting of prevention or of mitigation by sound sanitary measures. In this point of view, the classification adopted in the Reports of the Registrar-General is deserving of commendation.

102. There are some general considerations connected with disease which are of far higher importance than the use of terms, or the adoption of a correct nomenclature and a scientific classification. These will be treated of under the following heads:—(a) Causes; (b) Symptoms and Signs; (c) Diagnosis; (d) Prognosis; and (e) Treatment.

103. (a) *Causes of Disease.* (Etiology.)—Many verbal distinctions are in use in respect of the causes of disease, but the division most generally recognised is, into *proximate* and *remote*.

Proximate Causes (Causæ abditæ, continentés, occult causes.)—This term has arisen out of the twofold meaning of the word disease. If a disease happen to be named from that part which it attacks, and the nature of the change that part is undergoing, as pericarditis, or inflammation of the pericardium, the proximate cause is the disease itself; but if the name is the representative of a group of symptoms, as cough, dyspnoea, hectic fever, emaciation, &c.—the symptoms of pulmonary consumption—then the term proximate cause means the suppurating tubercle which gives rise to all these symptoms. If we are ignorant of the seat of a disease, as is the case with fever, the search after a proximate cause is but an inquiry into the real nature of the disease.

Remote Causes. (Causæ evidentes.)—All constant antecedents of

an event are called *causes* of that event, and all constant consequences of an event are called *effects* of that event. Hence the same thing may have many causes. Thus an hereditary taint, intemperance, or want, and a common cold, may exist in the same person as causes of pulmonary consumption. The hereditary taint may have rendered the person more liable than others to the formation of tubercles, intemperance or want may have occasioned their actual deposition, and the cold may have excited the dormant tubercle into activity. Now all these are *causes* of consumption, and the consumption may become the cause of death. How then are such causes to be distinguished from each other? They are divided into *predisposing* and *exciting*. In this instance, the *predisposing* causes are the hereditary taint, and the mode of life: the *exciting* cause is the cold: and the *proximate* cause (if the term must be used) the suppurating lung.

The condition of the body itself, however brought about, is the *predisposing cause* of any disease which may befall it; the *exciting causes* are external agents of various kinds, such as cold and heat. These external agents are also among the most powerful *predisposing* causes. Thus that combination which we call climate is the predisposing cause of a great variety of diseases; and any one of the elements of which it consists may become an exciting cause.

Some of the principal predisposing causes of disease have been already considered (§ 4—87) when speaking of temperaments, diatheses, hereditary predisposition, and idiosyncracies: of sex, age, occupation, and mode of life: of residence and climate. The local or constitutional injuries which supervene on severe attacks of illness must also be regarded as causes predisposing to attacks of the same disease.

The exciting causes of disease are chiefly mechanical and chemical injuries, unwholesome food, undue exertion of mind or body, sudden and violent atmospheric changes, parasitic animals and plants, atmospheric poisons, poisons generated by the human body itself, and the poisons of venomous insects, reptiles, and mammalia.

104. (b) *Symptoms and Signs of Disease*. (Symptomatology, semeiotics.)—All lesions of structure, whether from external injury or from internal change, cause some disorder in the functions of the body, and almost every disorder of one function leads to derangement in those which are most closely connected with it. These disordered functions are called *symptoms*. Thus redness, swelling, heat, and pain are symptoms of inflammation; and fever which is itself recognised by a certain combination of symptoms, is also a symptom of inflammation.

105. The term symptom is variously qualified in medical writings. Thus we have *anamnesic* symptoms, or those which relate to a patient's previous state of health; *diagnostic*, or those which distinguish his disease from others; *prognostic*, or such as enable us to predict the event of his disease; *pathognomonic*, or those which are peculiar to his malady, and to that alone; *therapeutic*, or such as indicate the treatment to be adopted; *objective*, or such as can be seen or otherwise

perceived by the physician himself; and *subjective*, or such as consist in sensations of the patient.

106. But we have also *signs* of disease; and the word *sign* has not precisely the same meaning as the word *symptom*, though the two terms are sometimes used without much discrimination. The difference between them is best shown by an example. Cough, expectoration, dyspnea, hectic fever, night-sweats, and emaciation are *symptoms* of pulmonary consumption, but they are not *signs*, for they may all occur in other diseases; but cavernous respiration and pectoriloquy are *signs*. So also expectoration is not a *sign* of consumption but a *symptom*, for it occurs in many other diseases of the chest; but a certain kind of sputa is stated to be a *sign* of that disease. From this it would appear that *signs* are merely pathognomonic or diagnostic symptoms. There is, indeed, nearly the same difference between a *symptom* and a *sign* as between a *character* and a *characteristic*. Redness, pain, heat, and swelling are *symptoms*, or *characters*, or *phenomena* of inflammation; but redness and heat are at the same time *symptoms* and *signs*, *characters* and *characteristics*: pain and swelling are merely *symptoms*.

107. The term *physical sign* is in common use among medical men; it means a *sign* which is an object of sense. Thus, heat, redness, and swelling are *physical signs* of inflammation; pectoriloquy of phthisis; coagulable urine of disease of the kidney. A *physical sign* is, therefore, synonymous with an *objective symptom*.

108. The first duty of the physician is the interpretation of symptoms: this he effects by careful examination. If, for instance, a patient complain of pain in the chest, he proceeds to ascertain whether that pain is external or internal, and if internal, what is its precise seat. If, again, a patient void urine different from that of health, he submits it to chemical tests, or he examines it by the microscope, that he may find out the exact nature of the change which it has undergone, and trace that change to its source. By thus weighing the value of every symptom, he learns what the disease is, what its severity, what the proper treatment, what the hope of recovery. His success will greatly depend on the method of examination which he adopts. Some of the more important methods are described in chapter iv.

109. The symptoms of disease are of very variable intensity; and even the most characteristic symptoms are sometimes wanting, or replaced by their opposites. Thus, a frequent pulse is among the most striking symptoms of pulmonary consumption; but in some cases the pulse does not exceed its average number in health, while in others it falls below it. In some of these cases, it is true, the number of beats may be really greater than it was in the same person in sound health, but by our ignorance of that number we lose the benefit of the symptom. This same symptom of increased frequency of pulse is among the most constant and characteristic attendants on fever, and yet in

some epidemics the pulse has been unusually infrequent. These anomalies meet the physician at every turn.

110. (c) *Diagnosis*, or the discrimination of diseases, is the necessary prelude to the treatment of disease. It is the first duty which the physician has to perform at the bedside, and everything depends on the way in which he discharges it. A correct observation and just appreciation of symptoms are essential to a true diagnosis. Diagnosis, indeed, may be said to be the art of converting *symptoms* into *signs*.

111. The first impression which a patient makes on his physician is always an important element in the diagnosis. In most cases it enables him to form some idea of his patient's previous habits of life; to determine whether he is suffering from a slight or a severe illness; and, in many instances, to decide at once upon the nature of his complaint. Thus, anæmia, consumption, pneumonia, emphysema, Bright's disease, fever, and severe diseases of the heart, are often so strongly marked on the very countenance of the patient as to leave no doubt in the mind of the experienced physician; and many other diseases, such as palsy, chorea, gout, and rheumatic fever, several of the exanthemata, and skin diseases in general, betray themselves by single symptoms which are decisive of their nature. The diagnosis in such instances is very simple; but the task of the physician becomes one of considerable difficulty when the disease is either imperfectly developed, as in the first stage of eruptive fevers, and in incipient phthisis, or when the only obvious symptom is one which may depend on several causes, as is the case with dropsy; and it is still more difficult when the nature of the complaint must be inferred chiefly from the description which the patient gives of his own sensations, or from a mere perception of the size and shape of a part of which the structure is concealed from view, as happens with the greater number of tumours. These are the cases which put the knowledge and skill of the physician to the test, and which sometimes baffle both.

112. In some cases we may have to wait till the characteristic symptoms show themselves; in others, to make minute examinations by means of the stethoscope; in others, to apply chemical tests to the urine, or to call in the aid of the microscope; and in a few, to confess our ignorance. The effects of remedies, such as bloodletting and stimulants, will also in rare instances serve as means of diagnosis. The symptoms which render us the greatest assistance in distinguishing one disease from another will be carefully examined in a future chapter.

113. (d) *Prognosis*. The meaning of this term is foreknowledge, and, as used by the physician, it means the anticipation of the course and event of diseases. The power of foretelling the progress and termination of a malady is of the first importance, not only as regards the treatment to be adopted, but as respects the comfort and well-being of the patient and his friends, and the reputation of the physician himself. A correct prognosis implies a just diagnosis, an accurate knowledge of the natural course and progress of disease, an appreciation of

all the peculiarities, original and acquired, which distinguish one man from another (§ 4—87), and experience of the power and mode of operation of remedies. It must be obvious from this statement that the art of prognosis is one of unusual difficulty, and that it ought, for the sake both of the physician and his patient, to be exercised with discretion and caution.

114. This subject is too extensive to be fully treated in this place; but it may be well to point out and illustrate one or two of the leading questions which the physician may be called upon to solve. One of the most common is, whether the disease admits of cure? The answer is sometimes very easy. A case of hydrophobia, on the one hand, or of hysteria, on the other, presents no difficulty. The one is as certainly fatal as the other is curable. But in a case of tetanus, of pneumonia, or of pulmonary consumption, the prognosis offers greater difficulty. The first would be most probably fatal: the second is always attended with danger, the amount of which will chiefly depend upon the sex, age, temperament, and previous habits of the patient; the third is fatal in a very large majority of cases, and the probability of ultimate and complete recovery is very slight.

115. This latter disease—pulmonary consumption—offers a very good example of the necessity of caution in forming and stating our prognosis. Pulmonary consumption is incurable, and medicine, at best, is but palliative; but if in every case of pulmonary consumption a physician were to foretell a fatal result, his reputation would suffer severely, for the simple reason that consumption, though ultimately fatal, in nine hundred and ninety-nine cases out of a thousand, is not necessarily fatal in any given attack, recoveries even from several successive attacks being by no means unusual; and this happens, not because the disease is curable, but because its fatality depends upon the amount of tubercular deposit, and the issue of any particular attack on the extent and activity of the suppurating process relatively to the power of the patient's constitution to bear the wear and tear consequent upon it. This is the true explanation of the asserted efficacy of medicines, regulated temperature, and change of climate in this disease.

116. This is the place to speak of that *vis medicatrix naturæ*—that power inherent in the human frame to right itself when suffering under severe disorders—which our predecessors were wont to acknowledge with such befitting modesty as their invaluable coadjutor in the treatment of disease; but which our own presumption leads us so often to overlook or undervalue. In thus withholding from nature the tribute which is her due, we are as unwise as we are unjust; for it is the obvious interest of the regular practitioner of the healing art to extol the powers of nature, and to attribute to them a large share of the success so commonly ascribed to his own treatment. It is only in this way that the public can be rescued from the grasp of empiricism. The homœopathist attributes to infinitesimal doses virtues which are simply

ridiculous, and results which are utterly impossible; but the regular practitioner can explain the cures alleged to have been effected by this preposterous agency by means of that very *vis medicatrix* which so constantly stands him in stead in his own treatment of disease, and to which so much of his own success is attributable. It is this *vis medicatrix* which, having been long counteracted by the administration of active medicines, but restored to freedom by that expectant treatment which is the very essence of homœopathy, constitutes the real agent in the restoration to health under the hands of a race of quacks whose treatment in most cases is in itself harmless. There are other forms of quackery, and certain quack medicines, which are far from being harmless when carelessly administered, but which are of real service in certain instances. The public is informed of these successful cases; the unsuccessful or the fatal ones are, for obvious reasons, unknown. The frequent recovery of patients suffering from pulmonary consumption, either without treatment, or under the use of remedies which could not have exercised any great influence on the disease, goes far to complete the explanation of the success of quackery in the several forms and guises it assumes; while the alleged efficacy of change of climate in cases of pulmonary consumption is an apt illustration of the occasional identity of the mistakes made by the regular and irregular practitioners of medicine.

117. To what has just been said respecting the *vis medicatrix* it may be well to add that some of the greatest improvements in the art of healing have consisted in simple abstinence from injurious interference. Three centuries ago, for instance, surgeons thought that they ought to treat gun-shot wounds with boiling oil. But Ambrose Paré, by the happy accident of his supply of boiling oil falling short, was led to adopt that better plan of treatment which consisted in virtually leaving the sufferer in the hands of nature. At the same time, a contemporary of that great surgeon was boasting of his success in treating this class of wounds by a slimy mixture called the 'oil of whelps,' which had, in reality, the same effect of leaving nature to work her own cure in her own way.

118. If the foregoing observations be well founded, it must follow that to determine whether a patient's recovery from disease has happened in consequence of the treatment adopted, or independent of it, or in spite of it, is one of the most difficult trials to which a man's judgment can be subjected. The accomplished physician must often err in his decision; the ignorant empiric and the equally ignorant public are utterly unqualified to form an opinion concerning it.

119. (*e*) *Treatment*.—A correct diagnosis, a knowledge of the nature of the disease itself, of the constitution of the sufferer, and of the virtues of remedies, are essential preliminaries to judicious treatment. The object which the physician proposes to himself will vary with each case. In one case, it will suffice to remove the ascertained cause of indisposition; in another, it will be necessary to restore the altered func-

tion or diseased structure; in a third, we can merely hope to palliate the suffering which the disease occasions.

120. Our treatment is sometimes founded on a correct knowledge of the nature of the disease and the mode of operation of our remedy, in which case we are said to pursue a *rational* treatment; in other instances, we act in ignorance of both, and then our treatment is said to be *empirical*. Again, our treatment may be *curative*, that is to say, it may restore the patient to perfect health; or *palliative*, in other words, adapted to the alleviation of suffering; or *preventive*, that is to say, directed to the preservation of health, or to obviate the recurrence of disease.

121. The abstraction of blood in inflammation is an example of *rational* treatment, for we understand both the condition of the part affected and the *modus operandi* of the remedy. The use of quinine or arsenic in ague is merely *empirical*, for we understand neither the nature of ague nor the mode in which these medicines affect the body in curing it. The treatment of pulmonary consumption is necessarily *palliative*, for, from the very nature of the complaint, it is obvious that it does not admit of cure. Such also is the case with most neuralgic affections, and with malignant diseases.

122. In the treatment of many diseases we combine the rational with the empirical, and the curative with the palliative. Thus, during an attack of remittent fever, we sometimes have recourse in turn to blood-letting to subdue local inflammation, to cold-sponging to diminish the heat of the surface, to stimulants to counteract existing debility, and to quinine to effect a cure of the disease.

123. Though the employment of remedies, the precise *modus operandi* of which we do not understand, constitutes what is usually designated as *empirical* treatment, the act of generalisation by which we infer the utility of the same remedies in other analogous disorders, lends to our empiricism something of a rational character. For example, though the employment of quinine and arsenic in ague was originally pure empiricism, the use of those remedies, as the consequence of analogical reasoning, in the whole class of intermittent disorders, deserves to be characterised by a more complimentary epithet.

124. In treating disease we are necessarily guided by a close observation of the state of the patient and by his previous history. If, for instance, a patient presents a pallid appearance of the skin, gums, and tongue, we prescribe some preparation of iron; if, on the contrary, the complexion and colour of those parts is florid, we shall probably see reason to order depleting or lowering remedies. Now these opposite states of system are said to afford *indications* of treatment—grounds or reasons, that is to say, for giving preparations of iron in the one case, and resorting to depleting or lowering measures in the other. On the other hand, these same states of system constitute grounds for avoiding the opposite modes of treatment; in other words, they are *contra-*

indications of depletion and tonic treatment respectively. In like manner acute inflammatory symptoms *indicate* the necessity of depletion and *contraindicate* the use of stimulants.

125. The considerations brought forward in this chapter will serve to show the extreme difficulty which attends the practice of medicine, and the necessity imposed on the physician of supplying himself with very extensive and precise information on all the subjects which can conduce to a knowledge of the human body, on the one hand, or of the virtues of remedies, on the other. But, after all that can be done, the science of medicine must remain extremely imperfect, and the art extremely difficult. Our general principles, derived originally from particulars made up of many variable elements, must be reapplied in practice to individual instances as complicated as those out of which they were originally formed, so that precision is, in the nature of things, impossible, and certainty of very rare attainment.

126. Other considerations, which go far to explain the acknowledged difficulty of medicine, both as a subject of scientific inquiry and of practical application, are:—the variable severity of diseases bearing the same name, the changes that occur in the progress both of acute and chronic cases, and the unequal strength of the remedies we administer. When we reflect that, prior to the setting in of any given disease, the constitution of the patient, originally marked by peculiarities traceable to hereditary predisposition, has been subsequently modified by the powerful influences already examined; that the disease itself may vary within wide limits of intensity; that it passes naturally through many different phases; that it may fall under observation and treatment at any part of its course; that the remedies prescribed, being of variable strength, may be administered with more or less care and regularity, and the patient attended with greater or less watchfulness and skill:—when we take all these circumstances into consideration, we cannot be surprised that medicine should be an imperfect and uncertain science, a conjectural and difficult art.

CHAPTER II.

CAUSES OF DEATH.

127. THOUGH a knowledge of the causes of death is of importance chiefly to those members of the medical profession who are engaged in the work of preventing disease, it is not without its interest for the practical physician. It supplies him, at least, with some definite idea of the relative frequency of the more severe and dangerous diseases, and of the demands which they severally make upon his attention.

128. The causes of death may be conveniently divided into three principal classes; of which the first comprises deaths by mechanical injuries, by scalds, burns, and corrosions, by the several forms of suffocation, by cold and want, by intemperance, and by poison; the second, deaths by debility in infancy and decay in age; and the third, deaths by disease properly so called.

129. In England the deaths are distributed through these three classes in the following proportions:—

Class I., 4 deaths; Class II., 16 deaths; Class III., 80 deaths.

130. The deaths in Class I. are so distributed that about half of the whole number are caused by mechanical injuries; about one-fourth by the several forms of suffocation (hanging, drowning, &c.); less than one-fifth by burns and scalds; one per cent. by cold and want; three per cent. by poison; and three per cent. by intemperance (exclusive of delirium tremens and other fatal diseases occasioned by excess).

131. The deaths in Class II. are nearly equally divided between deaths in early infancy by causes which interfere with complete development and adequate nutrition, and deaths from old age; the excess being somewhat on the side of the first of the two divisions.

132. The 80 deaths in every hundred which remain after subtracting Classes I. and II., and which are caused by diseases properly so called, may be distributed into a few leading classes. A very large and very important class consists of diseases propagated by contagion or infection, which destroy life by giving rise to severe local affections or by exhausting the vital powers. This class comprises small-pox, scarlet fever, measles, hooping-cough, typhus, typhoid, and puerperal fevers, and crsipelas. A second class of diseases is due, like the foregoing, to external causes, but not to contagion, or, if to contagion, not to that cause exclusively; and these are much more affected than the preceding class by atmospheric changes, and, like them prevail as epidemics. To this class belong ague and remittent fever, influenza, diarrhœa, dysentery and cholera, diphtheria, quinsey, and carbuncle.

A third class of diseases proves fatal chiefly to infants and young children. They have their source in some local irritation, such as teething, worms, or constipation, and lead to fatal affections of the brain and of the intestinal canal. This class comprises infantile fever, marasmus, and hydrocephalus. The largest class of all is made up of diseases which consist in a structural change or degeneracy of some texture or organ of the body. To this class belong scrofula, pulmonary consumption, and cancer. Diseases occasioned by some special impurity, or change of consistence, in the blood, constitute another class, of which rheumatic fever, scurvy, and gout, with pyæmia, are members. The remainder of the list is made up of fatal diseases of special organs, and of the accidents attendant on childbirth. Of the special organs, those of respiration (even exclusive of pulmonary consumption) occasion the greatest mortality; then those of the brain and nervous system; then those of the organs of digestion; then those of the heart and circulation.

133. The 80 deaths from disease remaining after the subtraction from the whole 100 deaths of those due to all other causes, are made up in the following manner:—

Diseases due to Structural Degeneration (including Pulmonary Consumption)	16
Diseases of the Organs of Respiration (exclusive of Pulmonary Consumption)	15
Contagious Diseases.	14
Diseases of Infancy and Childhood	9
Diseases of the Brain and Nervous System	7
Epidemic Diseases not being Contagious	6
Diseases of the Organs of Digestion and Assimilation	6
Diseases of the Organs of Circulation	4
Diseases due to changes in the Blood	1
Diseases of the Urinary Organs	1
Childbirth, &c.	1

134. If, instead of classifying fatal diseases chiefly in accordance with their natural and presumed causes, we distribute such of them as have their seat in the more important organs in accordance with the parts affected, we obtain, for 1000 deaths, the following results:—

Organs of Respiration	320
Brain and Nervous System	144
Organs of Digestion and Assimilation	104
Heart and Organs of Circulation	35
Urinary Organs	10
Childbirth and Organs of Generation in the Female	10
Joints and Organs of Locomotion	9
Skin and Integumentary System	6—638
All other Causes.	362

Total 1000

135. If from diseases of organs and systems of organs we pass to single diseases, we find the mortality from the more important diseases in England, in 1000 deaths, somewhat as follows:—

Pulmonary Consumption	125
Bronchitis and Asthma	78
Pneumonia	62
Convulsions	59
Scarlatina	41
Typhus and Typhoid Fever	38
Diarrhoea, Dysentery, and Cholera	36
Hooping-Cough	24
Paralysis and Apoplexy, each	21
Hydrocephalus and Measles, each	18
Cancer	14
Tabes Mesenterica	11
Croup and Teething, each	10
Influenza, Inflammation of the Brain, and Inflammation of the Bowels, each	8
Scrofula	7
Small-Pox	6
Erysipelas, Epilepsy, and Rheumatism, each	5
Ileus, Intussusception, and Stricture of Intestinal Canal	4
Inflammation of the Liver, of the Peritonæum, and of the Larynx, Jaundice, Ileus, Pleurisy, and Thrush, each	3
Syphilis, Ulcer of the Intestines, Hernia, Ascites, In- flammation of the Stomach, and Bright's disease, each	2
Inflammation of the Pericardium, Remittent Fever, De- lirium Tremens, Insanity, Diabetes, and Infantile Fever, each	1
Quinsey, Purpura, Aneurism, Cyanosis, Gout, Intempe- rance, Inflammation of the Bladder, Carbuncle, In- flammation of the Kidney, Stone, Stricture of the Urethra, Ovarian Dropsy, Noma, Tetanus, Agne, Ischuria, Fistula, and Chorea, each less than	1

The mortality from some of the last-named diseases is very small:—
164 in the million from chorea; and 33 from hydrophobia.

136. A chapter on the Causes of Death would be incomplete if some notice were not taken of what are sometimes called the *proximate causes* of death, or 'modes of dying.'

Death may be said to have happened when the heart has ceased to beat. Hence, in considering the proximate causes of death, or modes of dying, we are inquiring by what means the pulsation of the heart may be made to stop. The first and most direct mode is by acting on the muscular structure of the heart itself, which may be either paralysed by a nervous shock, or weakened by chronic structural disease. The second mode is by withdrawing, suddenly or slowly, the blood which should act as its stimulus to contraction. The third mode is by

cutting off, more or less suddenly, the supply of arterial blood to the left side of the heart by an impediment offered to the breathing. These three causes of death or modes of dying may be conveniently examined under the three heads of death by *asthenia*, death by *syncope*, and death by *apnœa*.

137. (1.) Death by *asthenia*. The beat of the heart, in a perfectly healthy person, may be suddenly arrested by several causes acting with great force on the nervous system. The lightning-stroke is one of them, strong mental emotion another, a violent blow on the head a third, a similar blow on the pit of the stomach or the shock of cold drinks a fourth. One or two of the more active poisons, such as prussic and oxalic acids, in full doses, destroy life in the same way. Certain poisons introduced directly into the circulation, have the same immediate effect; and so has air introduced through an open vein into the right side of the heart. The sudden effusion of even a small quantity of blood on the surface, or into the substance of, the brain may also cause this sudden arrest of the heart's action. The chronic structural diseases of the heart that may bring about this same mode of death are either fatty degeneration, which impairs and weakens the muscular tissue itself, or ossification of the arteries, which interferes with the due supply of arterial blood to the walls of the heart. Either of these conditions may so weaken it, that any of the causes just enumerated, acting with comparatively slight force, may suffice to bring about a sudden and fatal pause in its action.

138. (2.) *Death by Syncope*.—The most obvious cause of death by syncope is the sudden pouring out of a large quantity of blood from a wounded or ruptured vessel. But the body may be more slowly drained of the vital fluid by chronic hæmorrhage and by exhausting discharges of long continuance; so that at length the quantity of blood may be reduced so low, and its quality be so impaired, that the stimulus afforded to the heart is insufficient, and it ceases to act. Extensive ruptures and wounds of the heart destroy life partly by syncope and partly by disabling the organ, so that its propulsive power is either impaired or lost.

139. (3.) *Death by Apnœa*.—This form of death is much more common than either of the foregoing. By far the majority of persons die suffocated; a few by what may be termed direct suffocation; a much larger number by that general failure of respiration which attends the exhaustion of the strength brought about by all severe diseases. Direct suffocation may be occasioned by several causes:—by constriction of the throat, as in hanging and strangulation; by closing of the mouth and nostrils; by strong pressure on the chest; by exclusion of the air, as in drowning; by the substitution of a gas not containing oxygen for atmospheric air; by spasm of the glottis; by inflammation and swelling of the upper part of the larynx, caused either by hot water or corrosive poisons, or by disease; and by small foreign bodies wedged between the walls of the rima glottidis. Direct

suffocation is of comparatively rare occurrence in disease. It will suffice to state in general terms, that it may arise from causes affecting the larynx, or trachea, such as laryngitis and croup, or from causes affecting the more minute branches of the air-tubes and the air-cells, as in the rapid collection of blood, or of mucus, in lungs previously diseased. Direct suffocation might also arise from the admission of air into the pleura of one lung, the other being so diseased as to be unable to supply the wants of the system; and the same result would follow from large effusion of blood or of serum rapidly poured out into the sac of the pleura.

140. But, as it has been just stated, by far the majority of deaths from apnœa are due to that gradual failure of the respiration which attends the exhaustion brought about by all severe diseases. In other words, the greater number of persons die suffocated by the combined failure of the nervous power which governs the movements of respiration, and the secretion or exudation of fluids into the air-passages as the result of the extreme debility of the capillary vessels. Hence the quick breathing and loud mucons râle (death rattle) which combine to give warning of the near approach of death in the vast majority of those dying.

141. In this brief account of the direct causes or modes of death no allusion has been made to that cause which has been described as "death beginning at the head;" for death beginning at the head, or in the brain, is directly and immediately due, in one class of cases, to *asthenia*, in another class to *apnœa*. Death is due to *asthenia* in all those cases in which the injury to the brain is so great and sudden that in reacting upon the healthy heart it brings it directly and speedily to a stop, as well as in those cases in which the injury being less considerable, reacts upon a heart previously weakened by disease. Death, on the other hand, is due to *apnœa* when the injury to the brain not being sudden or intense in degree, reacts upon a healthy heart. This is the mode of death in the majority of cases of apoplexy, in which the fatal termination is ushered in by progressively increasing difficulty of breathing, and the death rattle.

CHAPTER III.

PHYSIOLOGY AND GENERAL PATHOLOGY.

142. THE human body is a machine of finished workmanship, and vast variety of uses, resembling, at the same time that it infinitely surpasses, the most perfect work of man's hands ; and containing within itself the means of ministering to its own growth and preservation, of repairing many of the injuries to which it is exposed, and of generating other machines of like structure and endowments. The body is also a laboratory in every part of which, at every moment, the most delicate chemical processes are being performed. This machine, with its exquisite mechanism and refined chemistry, is at the same time subject to change of place, to deprivation of the means of living, to violent death, or to more slow decay, according to the dictates of a voluntary agent who appears to be so dependent upon it, that all signs of his existence vanish before the last traces of its own vitality have disappeared.

143. All the minute structures of this machine are built up, all its movements regulated, and all its chemical processes carried on, under the direction of a force which acts through a machinery of its own, and which manifests its presence only by its effects. In our complete ignorance of the nature of this force we call it the "*vital principle*."

144. Of the nature of this force or principle two distinct views are entertained. 1. That life is an independent entity, a $\psi\upsilon\chi\eta$, or soul, which pervades the tissues of the body, and causes it to live, and that its disunion, or separation, from the body causes it to die. This was the theory of the ancients. 2. The second theory is that life is the collection of phenomena in organized beings, dependent partly on a certain structure and chemical composition, and partly on the existence of external agencies which stimulate them to action.

On closer examination, the body is found to consist of the following parts :—

145. A framework for locomotion and for the protection of its more important organs ; a nervous system with the brain and spinal marrow as its centre of sensation, volition, and thought ; a digestive apparatus for the assimilation of its food ; organs of circulation for distributing the nutritious liquid bleuded with the pre-existing blood ; viscera for the secretion of fluids destined to further uses in the economy ; other viscera for the purification of the blood, which is constantly undergoing contamination from the decomposition of the effete textures of the

frame; and a nervous network bringing all the important internal organs of the economy into effective and harmonious action.

146. Between all these parts a most close and intimate connection exists. If the heart ceased to circulate blood, or the lungs to purify it, the nervous system would no longer send forth those influences by which the heart beats and the chest breathes. If, on the other hand, the nervous centres suffer severe injury, respiration is prevented or impeded, and the heart soon ceases to beat. External influences also, on whatever part of the frame they act, affect not that part only, but through it other organs, and through these the entire body. Again, the mind affects the body, and the body reacts upon the mind, and both together form a being so intricate in structure, and so complex in function, that the continuance of life and the maintenance of health appear a constant miracle. But the perfection of this machine is equal to its intricacy; and thus it happens, that while the one provides under favourable circumstances for the free play of all its parts, the other exposes it under unfavourable ones to serious derangements of function and alterations of structure.

147. The brief outline just given of the constituent parts of the human frame will serve to indicate the contents of the present chapter, which are as follows:—

- i. The physiology and general pathology of the fluids, including digestion, chylicification, sanguification, and excretion.
- ii. The physiology and general pathology of the circulating organs, considered as instruments for the distribution of the blood.
- iii. Structural physiology and pathology.
- iv. The physiology and general pathology of the nervous system.
- v. Mental physiology and pathology.

I. PHYSIOLOGY AND GENERAL PATHOLOGY OF THE FLUIDS.

148. Digestion, or the conversion of the food successively into chyme and chyle: the composition and leading properties of the blood and its constituent parts; and the functions of the lungs, skin, kidneys, and liver, with the nature and composition of their secretions, are the subjects to be considered under this head.

149. *Digestion*.—It is now generally understood and admitted that waste of material is a condition of vital action; so that the slightest movement of the body, the most evanescent thought, the most transient exertion of the will, is accompanied by a loss of substance; which loss of substance is due to the death of certain particles of the organ concerned in the vital action. The consequence of this *death* of the minute constituent parts of the frame is that they fall under the control of chemical laws, and are resolved into compounds unfitted to support life. These baneful products of decomposition are absorbed into the blood, and carried in the current of the circulation to the organs destined for their separation and discharge. To supply the place of these dead and effete particles is a principal use of our food.

150. In an adult arrived at his full growth, in perfect health and vigour, and using no undue exertion of mind or body, the daily waste is repaired by the daily food, and the weight of the body undergoes little or no change from day to day. But there are many ways in which this nice balance of waste and supply may be destroyed. It may be destroyed by increased exertion without a proportionate increase of food; or by a still greater amount of exertion, the appetite remaining good, and the supply of food unlimited; or by increased exertion with diminished supply of food, as in training for the turf; or, lastly, with great rapidity, by entire abstinence from food. In all these cases the weight of the body is diminished. On the other hand, in healthy persons, with unimpaired digestion, the body gains weight by inactivity, or, within certain limits, by increase in the quantity of food.

151. In certain diseases, again, waste goes on with extreme rapidity: as in fever, where rapid destruction of the textures is combined with complete loss of appetite; in pulmonary consumption, where the local waste, added to profuse sweats or discharges from the bowels, exceeds the powers of assimilation; in *tabes mesenterica*, in which the diseased glands refuse to transmit the chyle; in diabetes, where the mal-assimilation of the food renders the repair of even a moderate loss of substance impossible; during exhausting discharges, which drain the body of its blood; and in some local diseases or injuries, attended by rapid loss of substance in the part affected—a loss which the most nourishing diet is unequal to repair.

152. During the period of growth, food is required not merely to supply the waste due to the destruction of parts, but to furnish new material. Hence the large consumption of food in childhood and youth in proportion to the dimensions of the frame.

153. One use of the food, therefore, is to supply the waste of substance constantly going on; and in order that it may fully discharge this function, it must contain all those elements, simple and compound, organic and inorganic, which abound in the structure of the body itself. If food destitute of some essential element be taken for a continuance the health sooner or later suffers. The omission betrays itself in severe functional derangements, or well-marked structural lesions. As water is the most abundant constituent of the body, it cannot be withheld even for a few days without serious consequences; and the waste of this essential element is attended by sensations of distress far exceeding in severity those which attend the waste of the more solid constituents of the frame.

154. The sensations of *hunger* and *thirst* are the appointed means by which we are warned of this twofold waste of the solids and fluids of the body, and by which we are invited to repair it.

155. In healthy temperate persons the intensity of these sensations bears a just relation to the wants of the frame; but there are some diseases in which the indications they afford are fallacious, and there are modes of life which tend to blunt them, or to render them unduly acute.

156. A sensation of hunger altogether disproportioned to the wants of the frame is not of uncommon occurrence. It is present in certain nervous and mental disorders, and in many persons who lead an indolent and inactive life; and in rare cases, analogous to those in which spectral illusions and other violent excitements of the organs of sense are present, it reaches that point of intensity which is characterised as *Bulimia*. The appetite, again, may be unduly stimulated by condiments, and by the arts of a refined cookery. On the other hand, it may be blunted by the use of opium, tobacco, and spirituous liquors in excess, and destroyed by sudden emotion, or intense mental application. It is also impaired or destroyed in the majority of diseases, especially in inflammatory and febrile disorders.

157. The sensation of hunger, though under ordinary circumstances a measure of the wants of the frame, sometimes deceives us as to its power of making a profitable use of the food supplied to it. In *tabes mesenterica*, for instance, the body wastes in consequence of the obstruction offered to the passage of the chyle into the blood; but the stomach remaining sound the appetite bears a due relation to the wants of the frame, and is often voracious. It is only in the more advanced stage of the disease, when hectic fever sets in, that the appetite fails and the digestion becomes impaired.

158. The same observations hold good in respect of thirst. There are many ways in which it may become disproportioned to the wants of the frame; such as the use of a hot and stimulating diet, salt meats, and wine or spirituous liquors in excess. Intense thirst also characterises the operation of the irritant poisons. But in this case it is partly a false sensation due to inflammation of the throat and fauces, to which parts the sensation of thirst is referred, and partly an indication of the pressing necessity for the dilution of the poisoned blood. There is also a diseased condition, the analogue of *bulimia*, known as *Polydipsia*.

159. As in a healthy and natural state of the body the appetite serves as an index of the amount of food required to repair the waste of the frame, so, in certain diseased conditions, does the utter failure of the appetite serve to point out the expediency of a total abstinence from food. This is especially the case during severe febrile attacks, when, all the secretions being suppressed, the gastric juice is no longer formed, digestion is rendered impossible, and indifference to food is heightened into a positive loathing, or *nausea*.

160. But though the sensations of hunger and thirst, in a healthy person, and under ordinary circumstances, may be regarded as accurate indications of the wants of the frame, these indications are not so exact as to supersede the influence of habit; for experience proves that a considerable latitude in the quantity of food and in the number of our meals is quite compatible with sound health. Nature does not prescribe in a manner not to be mistaken either the quantity or the time.

161. Nor is the quality of the food best adapted to the wants of

our frames indicated with such precision as to preclude the use of a diet varying greatly in different climates and among different races of men; for though the formation of the teeth is held to prove that man was destined to partake both of animal and vegetable food, experience proves that a diet consisting exclusively, or almost exclusively, of the one or the other is consistent with perfect health and great strength.

162. There is one period of life, however, at which the diet best suited to the wants of the frame is indicated in a manner not to be misunderstood, both by the absence of the means of mastication and by the supply of the food itself; namely, the period of infancy. The substitution at this period of a diet differing materially from that supplied by nature is often attended by fatal results. To this cause, in fact, though not exclusively, may be attributed the high mortality of the inmates of foundling hospitals during the first year of life, and of the children of the working class in infancy and early childhood.

163. The first step in the process of digestion is chiefly mechanical. It consists in the division and trituration of the solid portions of food by the teeth, the moistening of them by the saliva, and their propulsion into the stomach. The conditions essential to the perfect performance of this first part of the process of digestion are, therefore, the soundness of the teeth, the careful performance of mastication, and the secretion of a sufficient quantity of saliva. Of these, that which is under the control of the will—mastication, is often very insufficiently performed, either from habit, or from preoccupation of the mind by study or business. This is one cause of indigestion.

164. The saliva, as has just been indicated, serves the purpose of moistening the food; but it has also the power of promptly converting starch into sugar, and exerts this power on some part of the amylaceous elements of our food.

165. The morsels of food thus bruised, moistened, and changed in composition, being received into the stomach, cause its muscular coat to contract, and stimulate its vessels to the secretion of the gastric juice. After an interval of a few seconds, the stomach relaxes to receive the next morsel. When the meal is finished, a continuous peristaltic action of the muscular fibres sets in, commencing at the cardiac orifice, and extending through the entire organ, with greatly increased force and rapidity in the part nearest the pylorus. This peristaltic action, which continues at short intervals till the digestion of the meal is complete, is such as to cause the food to rotate in two directions simultaneously. It revolves from the cardiac orifice by the pylorus to the cardiac end of the stomach again, and at the same time rotates in an oblique direction from above downwards. In this way the several portions of the food become mixed, and exposed equally to the action of the gastric juice. The pyloric end is meanwhile constricted off from the general cavity of the stomach, so as to form a sort of supplemental cavity,

into which the food is received as it is converted into chyme, and from out of which it is allowed to pass into the duodenum by occasional relaxations of the sphincter opening.

166. The gastric juice, secreted under the stimulus of the food, is a clear, transparent fluid, without odour, slightly salt and perceptibly acid, the acidity being probably due to free lactic and hydrochloric acids. Its essential constituent is a peculiar principle called *pepsin*.

167. The gastric juice combines the properties of promptly disintegrating food, of converting coagulated into soluble albumen, and of checking putrefaction. It is poured out with great rapidity, in quantity proportioned to the food to be digested; but if the amount of food taken exceeds the wants of the frame and the indications of the healthy appetite, part of it remains undigested, and by undergoing decomposition generates carbonic acid and other gases.

168. When the food is of a solid or pulpy consistence, the gastric juice acts upon it almost immediately; but when liquids are taken in excess with the food, they must be removed by absorption before the process of digestion can take place, and this delay also favours dyspepsia.

169. The time required for digestion in the stomach varies in different persons, and in the same person at different times and under different circumstances. After a full meal an interval of four or five hours should be allowed to elapse before taking fresh food. The chief causes which affect the duration of the process, irrespective of the state of the body and of the stomach and its secretions, are, the quantity, quality, and degree of division of the food itself, the quantity of liquid with which it is mixed, and the quantity of saliva.

170. The states of body and mind most favourable to digestion are, repose and cheerfulness. Strong exercise of the body, and anxiety or preoccupation of the mind, impair the power of the stomach. Too short or too long intervals between meals are also injurious; the one by overtasking, the other by wearying, the organ. Strong alcoholic liquors in excess are eminently injurious; but when given in small quantity they act as condiments in promoting digestion.

171. The gastric juice acts out of the body almost as well as in the stomach, provided it be kept at the temperature of the organ and in motion. When the temperature is much lowered, its power is greatly impaired, and when raised to 115° or 120° Fahr. it is destroyed and cannot be restored. An artificial digestive fluid may be made by soaking the fresh mucous membrane of the stomach of an animal in dilute muriatic or acetic acid. At a temperature of from 99° to 100° it converts food into a substance closely resembling chyme.

172. Some important information respecting the function of digestion, and the properties of different kinds of food, has been obtained by Dr. Beaumont, M. Londe, and others, who have had opportunities of

narrowly observing persons afflicted with fistulous openings communicating with the stomach or small intestines. The more important conclusions arrived at by these observers, may be briefly stated as follows:—1. Animal food is more completely digested than vegetable food, but is retained longer. It appeases hunger more completely, and is more stimulating. 2. Vegetable food leaves the stomach with its texture only partially destroyed and very perceptible. When the wants of the system are not urgent, the digestion of those vegetable substances which are most difficult of assimilation does not begin till they arrive at the ileum, though fully exposed to the action of the gastric, biliary, and pancreatic fluids. When, however, the wants of the system are urgent, the digestion of these substances takes place much more promptly. 3. When animal and vegetable food are taken together the vegetable portion leaves the stomach first. 4. The more cohesive the food the longer does it remain in the stomach, and *vice versâ*. 5. The more nutritive the food the longer does it continue in the stomach. 6. Fatty and oily substances are most difficult of digestion. 7. As a general rule, boiled meats are more easy of digestion than roasted, and roasted than broiled.

173. The leading constituents of the food are differently acted upon by the gastric juice. Woody fibre, husks, and skins of fruits and grain, horn, hair, &c., are not at all digestible; albumen is dissolved and so changed in composition that it is no longer coagulated by heat; fibrine and coagulated caseine are dissolved and partially converted into albumen; sugar of milk becomes converted into lactic acid, and starch into sugar. Fat and oil pass out of the stomach unchanged, and, together with the amylaceous and saccharine matters which have escaped the action of the saliva and gastric juice, are reserved for the action of the bile and pancreatic fluid.

174. The pulstaceous mass which passes out of the stomach after the food has undergone the changes just described is known as the *chyme*.

175. Several attempts have been made to reduce the multitudinous ingredients of which our food consists into two or three leading classes of elementary principles. All food, whether animal or vegetable, may be said to be resolvable, in addition to water and certain inorganic matter, into three principal classes—the *saccharine*, the *albuminous*, and the *oleaginous*. Milk, the nourishment provided by nature for the young of animals, is a compound of all these principles, and blood contains them blended with certain effete matters.

176. This threefold division was suggested by Dr. Prout; but Liebig simplified the matter still further by substituting two groups for three, and distributing all the organic constituents or elements into the *nitrogenous* and the *non-nitrogenous*; the first class comprising all articles of food which can be resolved into the three gaseous elements oxygen, hydrogen, and carbon, and the second class embracing all those which contain the additional gaseous element, nitrogen. The non-nitrogenous group comprises fats and oils, gum, starch and sugar, spirits, wine, and

beer. The nitrogenous group contains the seeds of plants and the blood and tissues of animals, with the albumen, fibrine, caseine, and other analogous principles, which may be separated from them. The first, or non-nitrogenous group is supposed by Liebig to be heat-making or respiratory, the second tissue-forming or plastic.

177. Albumen, fibrine, and caseine are constituents both of animal and vegetable matters. They also resemble each other very closely in chemical composition; so that if albumen, fibrine, or caseine, be dissolved in a moderately-strong solution of caustic potash, and the solution be exposed for some time to a high temperature, we may obtain from it, on the addition of acetic acid, the same gelatinous translucent matter, which on ultimate analysis yields about 56 parts of carbon, 22 of oxygen, 16 of nitrogen, and 7 of hydrogen, in every 100 parts.

This is the *protéine* of Mulder; of which a hundred parts, with one of phosphorus and two of sulphur, constitute albumen, as found in the serum of the blood; with one of phosphorus and one of sulphur, fibrine; and with one of sulphur, caseine.

The other proximate organic principles, gelatin, chondrin, elain, stearin, margarin, hæmatosin, globulin, &c., also consist of the four gaseous elements (nitrogen, carbon, oxygen, and hydrogen), in different proportions, with or without phosphorus and sulphur.

178. The food, then, before it leaves the stomach, has undergone a twofold process of *reduction* and *conversion*. It has been reduced to a homogeneous pulp; and it has been submitted to a chemical action, by which starch has been changed to sugar, and albumen, with substances of analogous chemical composition, rendered soluble.

179. This pulpy product of digestion in the stomach passes, under the name of chyme, into the intestines, where it is largely diluted and submitted to further chemical changes by fluids poured into the canal. This process takes place chiefly in the duodenum, where the chyme is mixed with the secretions of the liver and pancreas.

180. The bile may be briefly described as a thin soapy fluid, which has the property of reducing fatty and oily matters to a state favourable to their absorption, of precipitating the albuminous matters previously rendered soluble by the gastric juice, and of neutralizing, by means of its alkaline constituents, the free acid of the chyme. But when mixed with the gastric juice out of the body, or when it regurgitates into the stomach, it wholly arrests the process of digestion. It also acts as a stimulus to the intestinal canal, promoting both the secretion of mucus and the muscular contraction of the bowels.

181. The *pancreatic fluid* appears to combine the properties of the saliva, gastric juice, and bile; for it converts starch into sugar, dissolves albuminous matters, and re-dissolves the albumen precipitated by the bile, and changes fatty and oily matters into an emulsion. It is, therefore, well fitted to complete whatever of digestion the action of the other fluids has left incomplete.

182. As one of the chief properties of the pancreatic fluid is to dissolve fatty matters, the discovery of such matters in the stools affords a strong probability in favour of disease of the pancreas, accompanied by an arrest or alteration of its secretion, or an impediment to its discharge into the bowel.

183. The action of the pancreatic fluid ends here; but the bile appears to play a more important part in the economy. It also subserves the function of respiration, its principal constituents, *taurin*, *cholic acid*, and *glycocin*, being substances rich in carbon and hydrogen, and having a strong affinity for oxygen. The sugar, which has been proved to exist in the blood of the hepatic vein, is also, from the large proportion of carbon it contains, admirably adapted to subserve the process of respiration.

184. The highly-carbonised substances which the bile contains are absorbed in their passage through the intestines by the lacteals and poured into the stream of blood; a small part only of the bile, estimated at one thirty-fourth part of the entire secretion, being rejected from the body in the fæces; while the highly-carbonised saccharine matters found in the hepatic vein pass on at once into the ascending aorta, enter the heart, and are circulated through the lungs.

185. The foetal liver doubtless performs analogous functions. The bile is secreted, and poured into the intestines, as in the adult: that portion of it which is fitted to form a part of the circulating fluid is absorbed and carried into the venous system; while that portion which in extra-uterine life mixes with the undigested remnant of the food and other effete matters, and is discharged from the bowels at short intervals, as fæces, accumulates in the intestines as meconium, and is expelled soon after birth or during delivery.

186. The biliary secretion stands alone in being formed from blood that has already served other purposes in the economy. As the vena portæ derives its supply mainly from the intestinal canal, it suffers distension whenever the coats of the intestines are loaded with blood. So that while the quantity of bile secreted depends upon the supply of blood from the intestines, the intestinal vessels are filled or emptied, and the functions of the intestinal canal promoted or hindered, by torpor or free action of the liver itself.

187. That the principal function of the liver is one subservient to the process of respiration is highly probable from the position in relation to the lungs of the organ itself, and from the peculiarity of its circulation. The portal vein is formed by the union of nearly the entire venous system of the alimentary canal. Of the blood which this venous trunk conveys to the liver part is used in secreting bile which finds its way back into the intestinal canal, and part passes on to the heart. If we suppose for a moment that the duct which conveys the bile into the duodenum were replaced by a vein discharging its blood into that viscus, we should have a most efficient safety-valve to guard

against the engorgement of the liver and lungs with blood. There is reason to believe that the gall-duct does really discharge this function in certain cases; for discharges of blood do actually occur from the biliary duct in extreme cases of congestion of the liver, whether connected with a similar state of the lungs or independent of it. Now it is obvious that an abundant secretion of bile, discharged into the duodenum and regurgitating into the stomach, or carried forward through the intestines, would answer the same end. This is the probable explanation of certain cases of bilious vomiting and diarrhœa, and of the excessive evacuations of bile which occur in phthisis pulmonalis and in diseases of the lungs, functional and organic. In cold climates, a sedentary life, giving little play to the lungs, conjoined with excessive indulgence in the pleasures of the table, leads to an increased secretion of bile, part of which passing into the intestines, doubtless tends to prevent congestion of the lungs, and part being absorbed into the blood tinges the conjunctiva, and, in extreme cases, the skin. Strong exercise in the open air, by calling the lungs into activity, and promoting a more thorough combustion of the carbon and hydrogen of the blood, lessens the necessity for the formation of bile, rapidly removes symptoms of indigestion, and restores the natural clearness of the complexion. In hot climates again, the demand upon the lungs for the combustion of the carbon and hydrogen of the blood being diminished, if more nourishment is taken than is required, bile is formed in increased quantity. In either case (whether in cold or hot climates), habitual excess in eating and drinking leads to the same result—functional or organic disease of the liver. Another acknowledged cause of liver disease is the abuse of the liquid hydro-carbons—the several forms of spirituous liquor.

188. The intermediate position of the liver—between the lungs on the one side, through the right cavities of the heart, and the intestines on the other, through the vena portæ—accounts for the frequency of functional and organic diseases of the liver, as indirect consequences both of pulmonary and of intestinal disorders.

189. The chemical process of digestion carried on successively by the saliva, the gastric juice, the bile, and the pancreatic fluid, is not completed in the duodenum, but continues throughout the small intestines, and is probably finally completed in the cæcum by the solution of the last undigested portions of vegetable matter.

190. As the food blended with the several secretions of the mouth, stomach, and intestines passes through the long tract of the small intestines, its nutritious portions are removed by the lacteals, and a residue of excrementitious matter passes into the large intestines, from which, after the absorption of some of its liquid constituents, it is discharged as *fæces*.

191. The quantity of *fæces* thus discharged is inconsiderable; for, in Dr. Dalton's experiments, ninety-one ounces of ingesta yielded only five ounces, or about 1-18th part, of *fæces*. The indigestible portion of

the food mixed with the unused portion of the bile, forms the natural stimulus to the motions of the intestinal canal. An excess of bile increases the peristaltic action, a deficiency of it, as in diminished secretion or obstructed flow of bile, causes constipation. In like manner, an excess of excrementitious, and especially ill-digested matters, produces diarrhœa; and the absence of all indigestible matter from the food tends to cause constipation. This is one of the evils of an over-refined cookery. The passage of the *fæces* through the intestines is also greatly promoted by the movements of respiration, and by all exercises by which the abdominal muscles are called into play. Hence the effect of sedentary habits in producing constipation.

192. Of the two portions into which the chyme is separated, viz., chyle and excrementitious matter, the chyle is absorbed by the lacteals, and conveyed into the thoracic duct, where it is mingled with the lymph collected from every part of the body by the absorbents. This mixed fluid, after having undergone changes in its course through the lacteals by which the quantity of albumen and the number of cells are greatly increased, is poured into the left subclavian vein, and becomes part of the blood. The absence of these changes is supposed to be one cause of disease, leading in children to obstruction of the mesenteric glands, and, at more advanced periods of life, to the deposit of an imperfect albumen mixed with fatty or earthy matters, constituting scrofulous matter, tubercle, and other morbid deposits.

193. To the changes which the food undergoes from its reception into the stomach till it is mingled, in the form of chyle, with the blood, the late Dr. Prout gave the name *primary assimilation*. The changes which take place in the capillaries during the formation of new parts, the conversion of the effete structures of the body into lymph, and those which the lymph itself is presumed to undergo in its passage through the absorbent system, he called *secondary assimilation*.

194. Both these processes of assimilation are subject to be imperfectly performed. In the primary process of digestion some one constituent of the food may be imperfectly acted on. The mal-assimilation may be limited to the saccharine principles (sugar and lactic acid, starch and gum) causing the formation of sugar, which finds its way into the blood and urine in diabetes; of oxalic acid, which, in union with lime, constitutes the oxalate of lime, or mulberry calculus; and of lactic acid, which abounds in rheumatic and hectic fevers, and is probably the chief ingredient in the acid liquors discharged from the stomach in dyspepsia. Mal-assimilation of the albuminous principles (albumen, gelatin, fibrin, and gluten) may lead to an excess of albumen, conveyed into the blood and eliminated by the kidneys, and to the formation of lithic acid and cystic oxide calculi: the mal-assimilation of the allied gelatinous principles leads to an excess or deficiency of urea, or of its equivalent, the carbonate of ammonia. The mal-assimilation of the oleaginous principle leads to a deficiency of fat in the frame, or leanness; an unusual power of assimilating this principle, to corpulence.

195. These forms of mal-assimilation are inferred to exist, not so much from the analysis of substances rejected from the stomach, or contained in it after death (though sugar has been found in the stomach in excess in cases of diabetes), as from discovering the products of such mal-assimilation in the blood and urine.

196. Dr. Prout thought that the want of power to assimilate one or other of the staminal principles may often be traced to hereditary predisposition, as well as to those causes which impair the general power of the stomach, liver, and pancreas.

197. The precise nature of the changes that take place in these minute parts, and which constitute *secondary assimilation*, cannot be determined by direct observation, but must be inferred from the composition of the blood, on the one hand, and of the various excretions on the other. In the formation of the several secretions and structures of the body, many ingredients of the blood, such as fibrin, albumen, salts, &c., must be removed, and the blood itself must be returned to the heart robbed of a portion of its chief constituents. In the destruction of the effete and useless parts of the frame, on the other hand, many new principles are formed, which are destined for removal by the excreting organs, and which, if not so removed, act as poisons, and give rise to serious diseases.

198. The principal structures of the body are the albuminous and the gelatinous. The *albuminous* structures which in health are resolved into lithate of ammonia, when mal-assimilated give rise to lithic acid gravel, and perhaps to certain combinations of cyanogen that act as subtle poisons. During this imperfect assimilation, certain diseases of the albuminous tissues are supposed to arise. The *gelatinous* tissues which in health are resolved into lactate of urea, when mal-assimilated, are converted into sugar and urea, or into oxalic acid and urica, the urea being replaced in either case by carbonate of ammonia. The mal-assimilation of these textures also leads to certain diseases of the skin, and to destructive suppuration of the cellular tissue. The elimination of sugar by the kidneys constitutes diabetes mellitus; and oxalic acid, combining with lime, forms the mulberry calculus.

199. This outline of the processes of primary and secondary assimilation must be received with reserve, as a theory undoubtedly true in some parts, and a fair inference from observation; but in any case as suggestive of useful reflections and important inquiries.

200. The food has now been traced through the successive mechanical and chemical processes which constitute digestion to its mixture, as chyle, with the mass of the circulating fluid. How the milk-white contents of the thoracic duct are converted into red blood, or, to speak more precisely, how the red globules which are superadded to the colourless constituents of the blood are formed out of the materials supplied by the lymph, we are, in a great degree, ignorant. It has, however, been shown that the lymph itself contains lymph-corpuscles.

differing from the red particles chiefly in colour, and in all probability destined to form the groundwork of them. The next subject for examination is the blood itself.

201. *The Blood*.—This fluid, as it circulates in the vessels, is of a very mixed character, for it is being constantly renovated by chyle derived from the food, and contaminated by lymph absorbed from the tissues; so that it contains all the materials required for the formation, nourishment, and growth of the tissues, and also all the new elements into which these tissues are resolved when no longer fit to form constituent parts of the frame.

202. The quantity of blood contained in the adult body has been variously estimated at from 8 to upwards of 30 pounds. The quantity of blood which can be caused to flow from the dead body of a decapitated criminal, added to that which can be washed out of its vessels, amounts to about one-eighth of the weight of the body itself. This, which is the highest ascertained proportion, would give 20 pounds of blood for an adult weighing 160 pounds. The quantity of the blood must, however, be subject to much variation. It is at its maximum within a few hours of a hearty meal, at its minimum after a long abstinence.

203. The specific gravity of the blood is about 1055. It has been known to reach 1059 in robust men, and to fall as low as 1050 in women. In pregnant women it has been found as low as 1045. It is also of low specific gravity in very young infants.

204. The temperature of the blood is about 100° Fahr.

205. Its colour is bright red in the arteries, and dark red in the veins. It is fluid when circulating in the living textures, but coagulates in from three to seven minutes after removal from the body.

206. It consists of red particles or corpuscles, to which it owes its colour, of colourless finely granular cells—white corpuscles, and of a transparent colourless fluid, consisting of serum holding fibrine in solution, and known as *liquor sanguinis* or *plasma*. The red corpuscles form half the bulk of the blood of which they are the heaviest part, their specific gravity being 1088. The proportion of white corpuscles is about 1 to every 100 of the red.

207. The blood in coagulating separates into two parts, the crassamentum, or clot, and serum. The clot is formed by coagulated fibrine enveloping the red and white corpuscles and part of the serum: its consistence, therefore, depends upon the relative quantity of these constituents. When the fibrine is large in proportion to the other constituents, the clot is firm; when it contains much serum, it is loose.

208. When blood-letting was being constantly employed as a remedial agent, it was usual to examine the blood, with a view to a more accurate knowledge of the state of system in which the remedy had been prescribed; and certain appearances in the clot were held to prove the existence of inflammation. The importance of this procedure has

diminished as a resort to the lancet has become less common; but the phenomena of coagulation are still deserving of attention.

209. The appearance supposed to indicate the existence of inflammation, to justify the past abstraction of blood, and to warrant a fresh recourse to the lancet, was a concave and buff-coloured coating. When the blood presented both these characters, it was said to be *buffed* and *cupped*.

210. Healthy blood drawn from a vein, and suffered to remain at rest, undergoes two principal changes, the one consisting in the subsidence of a portion of its red particles, the other in a coagulation of the mass of the fluid. The subsidence of the red particles begins to take place as soon as the blood is drawn; the coagulation rapidly follows, and in about ten minutes converts the blood into a loose jelly. The blood thus transformed from a homogeneous fluid into a nearly homogeneous solid undergoes a further change, which is often not complete till after the lapse of twenty-four hours or more. This change consists in the progressive contraction of the fibrine in the lower part of the mass, so as to entangle the red particles and press out the serum; and this mass of fibrine and red particles floating in the expressed serum constitutes, as has just been stated, the clot.

211. The upper layer of this clot contains no red particles. It consists wholly of the buff-coloured liquor sanguinis, hollowed or cupped by the strong contraction of the fibrine. As the lower portion of the clot, which consists of fibrine and red particles, is larger and looser, the outline of the clot is not unlike a cupping-glass.

212. According to this view, the size, shape, and colour of the clot may be influenced by more causes than one. If the red particles retain their natural specific gravity, while that of the liquor sanguinis is diminished, or if they have a greater specific gravity than usual, whilst the liquor sanguinis has its normal density, or, again, if they have an unusual tendency to coalesce and adhere (as has been shown to be the case in inflammation), they will sink rapidly, and the separation between the upper and lower parts of the clot will be complete. The opposite conditions of the two portions of the blood will, of course, produce opposite results. If, whilst the contractility of the fibrine remains the same in two cases, the quantity is increased in one and diminished in the other, the clot will be large in the one case and small in the other. If the quantity of fibrine remaining the same in two cases, the contractility is great in the one and small in the other, the cupped appearance will be present in the one, but absent in the other. The thickness of the buffed surface will depend upon the quantity of the liquor sanguinis which has separated from the rest of the clot; and this quantity will vary with the time which elapses before the fibrine begins to contract. The slower the coagulation, therefore, the thicker the buffy coat. Again, a great diminution in the quantity of the red particles would favour the complete separation of the liquor sanguinis, and become a cause of the buffy coat.

213. In the process of coagulation, then, there are two stages or steps—the subsidence of the red particles and consequent separation of the liquor sanguinis, and the contraction of the fibrine. The quantity of the liquor sanguinis, and the consequent thickness of the buffy coat, will vary directly as the rapidity of the coagulation and the density of the red particles; the surface of the clot will be flat or hollow as the contraction of the fibrine is more or less firm; and the size of the clot will vary directly as the quantity of the fibrine, and inversely as its contractility.

214. The separation of the liquor sanguinis and the degree of contraction of the fibrine, which so greatly modify the appearance of the clot, are themselves influenced by a variety of causes. The separation is more complete, and the buffy coat, *cæteris paribus*, more strongly marked when the blood is drawn in a full stream into a deep vessel; the reverse takes place when the stream is slow and the vessel shallow. The temperature of the blood itself, and of the place in which it is kept, also exerts an influence, warmth being favourable to complete separation. The same is true of exposure to the air. The size of the stream and the depth of the vessel probably affect the separation by retaining the warmth for a longer or shorter period.

215. The contraction of the fibrine is also strongly influenced by the shape of the vessel into which the blood is drawn. Thus, in one experiment performed by Dr. Babington, the clot formed in a pear-shaped vessel weighed scarcely half that formed from the same blood in a common pint basin; that is to say, the fibrine contracted more firmly, and pressed out a larger quantity of serum and red globules in the former case than in the latter.

216. Seeing that such slight causes can influence the formation of the clot, it is scarcely to be expected that much reliance should be placed on the cupped and buffed appearance of the blood as a sign of inflammation, unless great precautions are used to insure an accurate resemblance of one observation to another in every respect.

217. But even where, as in the experiments of M. Andral and others, such precautions have been adopted, a cupped and buffed appearance of the blood has been observed in diseases unaccompanied by inflammation, as in chlorosis, in which disease it was present in sixty-four per cent. of the cases, but in a still larger proportion of cases of acute rheumatism and inflammatory sore throat.

218. The mere presence of the buffy and cupped coat, therefore, is by no means a sure indication of the existence of inflammatory action: all that it indicates is, that there is an alteration in the relative quantities of the fibrine and the red corpuscles, or an excess, either absolute or relative, of the fibrine; and these phenomena may occur in diseases not characterised by acute inflammation.

219. The quantity of the *crassamentum* (the combination of fibrine and red globules with a variable proportion of serum) varies within wide limits. The blood of men contains, according to Lecau, more of the

chief constituents of the crassamentum—viz., fibrine and red corpuscles—than that of women: they are also more abundant in the sanguine temperament than in the lymphatic.

220. The number of the *red particles* evidently differs in different persons at different times, and it probably varies with age, sex, temperament, and state of health. According to the researches of Becquerel and Rodier, the quantity by weight varies from 113 to 152 parts in a thousand; the average for healthy males being 141 parts, and for healthy females 127 parts.

221. Each of the red particles of the blood is a biconcave disc consisting of a capsule, inclosing a homogenous, faintly granular, semisolid, red-tinted substance. When the blood is mixed with water the particles swell by imbibition; but if mixed with syrup, or a liquid of greater specific gravity than the blood itself, they are observed to shrink and become puckered from the exudation of their liquid contents. It is probable, therefore, that by swelling when the specific gravity of the blood is reduced, and shrinking when it is increased, the red particles may serve to maintain a more uniform consistence of the circulating fluid.

222. This fact admits of a practical application. When we wish to examine a spot of dried blood under the microscope, in the hope of detecting some of the red particles in their entire state, we employ as our solvent either serum, or a saline solution, or glycerine, or a thin syrup.

223. The red corpuscles are variously affected by chemical agents and by some of the secretions. The bile, for instance, completely dissolves them.

224. The proportion of *fibrine* in healthy blood varies from $1\frac{1}{2}$ to $3\frac{1}{2}$ parts in a thousand, the average being $2\frac{1}{3}$. It is more abundant in arterial than in venous blood, in about the proportion of 5 to 4.

225. The *serum* is a straw-coloured fluid, holding albumen in solution. When heated to 167° Fahr., the albumen coagulates, and separates. This coagulation and separation of the albumen take place equally when the serum is mixed with other liquids, such as the urine: so that heat becomes a test for the presence of serum in the urine, and a valuable sign of the existence of a certain form of disease of the kidney.

226. The fluid which remains after the separation of the albumen is called the *serosity*. It consists of extractive matters and inorganic salts (principally of soda) dissolved in water.

227. The quantity of the several constituents of the serum varies in the two sexes, at different ages, and in different temperaments. The quantity of *water* is greater in females than in males; in children and aged persons than in persons of middle age; and in the lymphatic temperament than in the sanguine. In healthy males it has a range of from 760 to 800 parts in a thousand, and an average of 779; and in healthy females, a range of 773 to 813, with an average of 791. The

quantity of *albumen* ranges from 62 to 75 parts in a thousand, the average being about 70 parts.

228. In addition to the constituents just mentioned, the blood contains, in minute quantity, a variety of principles, which are destined to be removed from the body by the various excreting organs, especially by the kidneys. When these excretions are checked from any cause, the materials which ought to have been removed from the body accumulate in the blood, and may be detected by chemical reagents.

229. The blood is supposed to have an independent principle of life. Whether this be the case or not, it exercises an important influence on the functions of all the organs of the body, nor can its composition be materially changed without serious consequences to health. The best argument in support of the vitality of the blood, is the fact that it is developed in the ovum previous to the formation of the heart.

230. The blood undergoes various changes in disease. These consist of—(a) Sensible changes; (b) Variations in the relative proportions of its constituent parts; (c) The admixture of substances foreign to its composition in health.

231. (a) *Sensible changes*.—The *quantity* of blood is increased after the taking of food and in plethora, and diminished in cases of hæmorrhage and after long abstinence. It is also said to be diminished in anæmia; but the pallor of the surface, which characterises that disease, may be occasioned solely by a deficiency of red corpuscles. Its *temperature* is increased in many diseases accompanied by a rapid circulation, as in severe inflammations and inflammatory fevers: on the other hand, it is diminished in languid states of the circulation, and especially when the blood is imperfectly decarbonised, as in apnœa, poisoning by prussic acid, cholera, and cyanosis. The *colour* of the blood is more florid in the cases in which its temperature is raised; and of a darker hue in those in which its temperature is lowered.

232. (b) *Variations in the relative proportions of its constituent parts*.—The *red particles* are in excess in plethora, and in defect in anæmia, in which disease the white corpuscles are in great excess. They are more slowly reproduced than the other constituents of the blood, hence the long continuance of pallor after hæmorrhages. The *fibrine* is increased in acute inflammations, especially of the serous membranes, in acute rheumatism, pneumonia, phthisis, erysipelas, cyananche tonsillaris, and absorbent inflammation. The greatest increase takes place in acute rheumatism, in which disease it is sometimes nearly three times as great as in health, and continues in excess after repeated bleedings. It is also in excess in the pregnant female. On the other hand, the quantity of fibrine is diminished in fevers which are not inflammatory, in cerebral congestions and hæmorrhages, in scurvy, in profuse hæmorrhages, and in inflammation of the mucous membranes. The quantity of the *serum* increases as that of the *clot* diminishes. The quantity of *water* in like manner increases as that of the more solid ingredients decreases. It is in excess in anæmia, and in chronic diseases

accompanied with great debility. The quantity of the *albumen* probably bears a near proportion to that of the fibrine; it is greatly diminished in cases of Bright's disease. The *salts* of the serum are diminished in typhoid fever, and in cholera morbus.

233. These facts are stated chiefly on the authority of Andral and Gavarret,* to whom we are indebted for the following table of the variation observed in the quantity of the chief constituents of the blood in disease, compared with the average in health.

Fibrine varies between	10.5	and	0.9	per 1000 parts—average in health	3
Globules	185	21	.	.	127
Solid matters of serum	114	57	.	.	80
Water	915	725	.	.	790
Inorganic matters of serum	8	5	.	.	8

234. (c) *Admixture of substances not found in the blood in health.* These are of four kinds:—1. The results of mal-assimilation of the food. 2. The elements of the natural secretions and excretions. 3. Morbid secretions of the blood itself; and 4. Poisons introduced from without.

235.—1. Sugar, which is secreted in a certain quantity by the liver, is sometimes found in undue proportion in the blood as the result of mal-assimilation in the stomach, and oxalic acid found in combination with lime in the urine, is presumed to have existed as such in the blood itself.

236.—2. The elements of the secretions and excretions accumulated in the blood, in consequence either of disease of the proper excreting organs, or of the excessive production of those elements during primary and secondary assimilation, are chiefly the following: urea, lactic acid, fatty matter in excess, colouring matter of the bile, cholesterin, free carbonic acid, and casein.

237.—3. Of the morbid secretions of the blood itself, the chief is pus, which, under certain circumstances, is absorbed from the veins or from suppurating surfaces, and carried into the circulation.

238.—4. Almost all poisons introduced into the stomach, by wounds, or by the unbroken skin, find their way into the blood, and may be detected there by appropriate tests. Among vegetable products may be mentioned alcohol, hydrocyanic acid, chloroform, camphor, opium, indigo, and rhubarb; among animal substances, musk; among minerals, arsenic, antimony, baryta, lead, copper, mercury, silver, iodine, and the ferrocyanate and nitrate of potass.

239. The various constituents of the blood are separated and thrown out among the textures of the body, or on the surface of membranes, or discharged by the several outlets. Fibrine plays an important part in every process of reparation; water and serum are formed in the sacs of serous membranes, and in the cellular tissue; the red corpuscles escape in

* Annales de Chimie et de Physique, Nov. 1840.

peculiar states of debility ; while in cases of inflammation, accompanied by loss of substance, a new liquid (pus) is formed.

240. The chyle and lymph which are continually added to the blood bring with them many useful and some hurtful principles which must be excreted from the body. The organs by which this is effected are the lungs, the skin, the kidneys, and the liver.

241. *Respiration.* The air-tubes, after repeated divisions and subdivisions, terminate in small vesicular cells, on the walls of which a minute capillary network of blood-vessels is distributed. The membrane which constitutes these cells, and through which the atmosphere acts upon the blood, is believed to be at least thirty times as extensive as the surface of the body. The lungs, therefore, constitute one vast excreting surface, from which is constantly escaping into the air a mixed cloud of carbonic acid gas and water, an interchange of carbonic acid gas and oxygen taking place through the membrane of the cells. This elimination of carbonic acid gas and absorption of oxygen are accompanied by a change in the colour of the blood from dark blue to light red.

242. Viewed as excreting organs, the lungs have this peculiarity, that they require for the due performance of their functions the contact and constant renewal of atmospheric air, which are brought about by the alternate expansion and contraction of the walls of the chest, coinciding with the depression and elevation of the diaphragm. These alternate movements of inspiration and expiration take place, on an average, in healthy and well-formed adults, about eighteen times in a minute.

243. The whole of the air in the lungs is not renewed at each inspiration. After ordinary expiration it has been calculated that 108 cubic inches of air remain in the lungs ; and it is probable that the quantity subject to change does not exceed 15 cubic inches. At this rate, and supposing the number of respirations to be twenty in the minute, no less than 432,000 cubic inches, or 250 cubic feet, of air will be required to support the function of respiration during twenty-four hours. This, however, is on the supposition that the body remains during the whole of that time in a state of rest ; but under ordinary circumstances of alternate rest and exercise, there can be no doubt that this estimate will have to be very greatly increased.

244. From a calculation based on the assumption that $10\frac{1}{2}$ ounces of carbon are eliminated from the lungs and skin of an adult male in 24 hours, it may be inferred that the quantity of air required to support the functions of the lungs and skin during that time (no portion of air being used more than once), falls little short of 2000 cubic feet ; so that if a man were shut up in a perfectly close apartment, opened only once every 24 hours, he ought to have that space allotted to him. On the same principle, a close bedroom occupied during a night of eight hours, ought to have nearly 700 cubic feet of air for each male occupant. This space can only be safely curtailed where sufficient ventilation is practised ; but the space allotted to each adult during 12 hours,

whether by day or night, ought in no case to fall greatly short of 1000 cubic feet, that is to say, a cube 10 feet in each dimension. In buildings for the reception of the sick, this quantity should be increased at least one half. In apartments occupied for shorter spaces of time, 75 cubic feet per hour would be a sufficient allowance. The quantity may be reduced in the case of adult females and young and aged persons of either sex.

245. The quantity of air drawn into the lungs at each inspiration, has been just taken at 15 cubic inches; but there is no point upon which the results of experiment differ more widely than this. Vierordt has shown that in his own person the quantity at one time may be nearly five times as great as at another, the minimum being 11, an average of the maxima 43, and the mean of all his observations 31; and Valentin, by experiments on young adult males, whose respiration was tranquil, or only somewhat quickened, obtained a minimum of 14, a maximum of 95, and a mean of 40 cubic inches. The principal experimenters on respiration give estimates or measurements founded on experiment, ranging from a minimum of 12 cubic inches (Goodwyn and Abernethy), to a maximum of 40 cubic inches (Turin and Menzies).

246. According to the lowest estimate, the quantity of carbonic acid gas formed in twenty-four hours amounts to 14,930 cubic inches, or 8,534 grains; according to the highest, to 39,600 cubic inches, or 18,612 grains. The mean of the three estimates (Lavoisier and Seguin, Davy, and Allen and Pepys) is nearly 28,736 cubic inches, or 14,985 grains. The quantity of carbon removed from the blood will therefore be, according to the lowest estimate, 2,820 grains, according to the highest, 5,148, and the mean of the three estimates will give 4,273 grains, or nearly 10 ounces avoirdupois. This estimate falls short by a quarter of an ounce of that given by Dr. Dalton. (§272.) Liebig found that an adult taking moderate exercise expires daily from the lungs and skin an average of 13.9 ounces of carbon.

247. Air once respired contains nearly 5 per cent. carbonic acid; but however frequently the same air is breathed, it never contains more than 10 per cent. The respired air is diminished by about $\frac{1}{24}$ of its volume. This decrease is probably owing to the absorption of oxygen. When pure oxygen is breathed, the quantity of carbonic acid given off from the lungs is increased.

248. Dr. Prout's experiments show that the quantity of carbonic acid generated in a given time is greatest between 11 A.M. and 1 P.M., smallest between 8 $\frac{1}{2}$ P.M. and 3 $\frac{1}{2}$ A.M. It is therefore less at night than during the day. It is also less in females than in males; in young and old than in middle-aged persons. It is increased by repletion and exercise, and lessened by fasting and rest. It is also diminished by depressing passions, by fatigue, by spirituous liquors, tea, or vegetable food, and by the long-continued use of mercury. Carbonic acid is also given off in larger quantity when the barometer is low, and the quantity is greater for low than for high temperatures.

249. Besides carbonic acid, water is exhaled in large quantity from the lungs. In twenty-four hours this quantity amounts, according to the estimates of different authorities, to from 2,880 to 13,704 grains, or from about $6\frac{1}{2}$ ounces to one pint 11 ounces.

250. The chief function of the lungs, then, is to free the blood from carbonic acid and water. The separation of carbonic acid from the blood, and the absorption of oxygen, is necessary to enable that fluid to act as the efficient stimulus to all the functions of the frame, and to minister to its growth and nourishment. The suspension of respiration for a few minutes is fatal to life, and the circulation of blood not purified by respiration exercises an injurious influence on all the organs of the body, but particularly on the nervous system.

251. The quantity of carbonic acid exhaled from the lungs is greatly increased in the first stage of small-pox, measles, and scarlatina, as well as in various chronic diseases of the skin. On the other hand, the quantity of the gas is diminished in typhus fever.

252. The lungs also serve as channels through which many volatile matters taken into the stomach escape from the system almost unchanged; and the sweet breath of some healthy persons and the tainted breath of cachectic patients proves that those organs may also serve as the avenues through which other volatile matters contained in the blood, and formed within the system, find their way out of the body. Bernard's experiments also prove that the lungs are the channels through which sulphuretted hydrogen introduced into the circulation escapes from the body; and it is reasonable to suppose that other gaseous substances contained in the blood pass out of the body in the same way.

253. *The Sweat.*—The *Skin* performs functions of great importance in the economy; for it not only separates from the blood substances which would be injurious if retained in it, but also regulates the temperature of the body by the evaporation from its surface. The chief constituents of the sweat are water and carbonic acid. To these may be added nitrogen, ammonia combined with lactic acid (according to some, with acetic acid), urea, and a variety of salts.

254. The carbon eliminated by the skin in twenty-four hours amounts, according to Dr. Dalton, to a quarter of an ounce, being a very small fraction of that given off from the lungs. Sometimes carbonic acid is exhaled with nitrogen, sometimes nitrogen alone is given off, and at others neither of them is present. The quantity of these gases also varies considerably. It is increased by food and by muscular exertion. It also appears that nitrogen is most abundant after animal, and carbonic acid, after vegetable, food.

255. The exhalation from the skin amounts, according to Dr. Dalton's estimate, to $6\frac{3}{4}$ ounces in twenty-four hours. The more accurate experiments of Seguin give 7 grains per minute in a male in a state of rest, which would amount in twenty-four hours to little less than $1\frac{1}{2}$ lb. avoirdupois, a quantity certainly much too high for the entire day.

256. The aqueous exhalation is partly mere evaporation, and partly a secretion. The *evaporation* is affected by common physical agents. It is increased by a dry and warm atmosphere, by air in motion, and by diminished pressure of the atmosphere; it is lessened by moisture, by stillness of the air, and by increased atmospheric pressure. The *secretion* is increased by these and by internal causes, as by moderate excitement of the circulation; and it is diminished by rest.

257. The perspiration is *diminished* when other secretions are greatly increased: thus the skin is dry in diarrhœa, diabetes, cholera, and dropsy. The perspiration is also diminished in the cold stage of intermittent and continued fevers, and at the commencement of all febrile affections. In these cases the secretion is deficient, from the small quantity of blood circulating through the vessels of the surface. On the other hand, whenever the quantity of blood is greatly increased, as in acute inflammations, in the hot stage of fever, and in the febrile exanthemata, the same result follows.

258. The secretion from the skin is *increased* in the sweating stage of intermittent fevers; in continued fevers of the less severe kind; in catarrhal and miliary fevers; and in inflammatory affections attended by febrile symptoms of moderate severity. It is also increased when determination of blood to the skin is combined with debility of the capillaries, as in hectic fever, especially in that which attends phthisis pulmonalis. In extreme debility, again, the perspiration is augmented in consequence of the debility of the capillary vessels, though the quantity of blood circulating through those vessels is diminished. Such are the cold sweats of the dying. The perspiration is also very abundant in acute rheumatism, and in hypertrophy of the heart.

259. The *odour* of the perspiration, which is naturally sour, is heightened in catarrhal, rheumatic, and arthritic diseases, in childhood affections, and in intermittent fevers. In some cases of mania and of pulmonary consumption the sweat has a peculiarly offensive odour. The acid odour is due to the presence of acetic and lactic acids.

260. Sweats are sometimes partial, as in phthisis; sometimes general, as in the sweating stage of fevers. General sweats are commonly preceded by partial ones.

261. Remedies act on the skin chiefly through the circulation, some by diminishing, others by increasing the strength of the heart's action. The passions of the mind also affect the secretion from the skin, by exciting or depressing the action of the heart, the more agreeable emotions producing a warm moist glow, the stronger depressing emotions, copious cold perspirations.

262. *The Urine.*—The kidneys subserve the twofold purpose of removing a portion of the liquid and solid matters which have been taken as food, and the greater part of the materials resulting from the disorganization of the nervous and muscular tissues. These occur under the form of urea and uric acid, and certain sulphates and

phosphates, dissolved in water. The urine is often the channel for the elimination of other substances foreign to the usual composition of the food, such as certain poisons and medicines. The quantity of urine excreted in 24 hours varies according to the activity of the skin; 48 ounces is about the average. Whatever be the quantity it should contain about 1 ounce of urea.

263. Its most important constituents are water, urea, and uric acid. The two latter ingredients consist of the following elements:—

	Nitrogen.	Carbon.	Oxygen.	Hydrogen.
Urea contains	47 ..	20 ..	27 ..	7
Uric acid ,,	31 ..	40 ..	27 ..	2

264. This table shows that urea and uric acid contain a very large proportion (urea nearly fifty per cent.) of nitrogen, and that they are the principal means by which this gas is eliminated from the system. These substances vary with the quality of the food; they are increased by animal, and diminished by vegetable, diet; they are almost absent in infants at the breast; and go on increasing towards manhood.

265. The quantity of the urine is increased by the suppression of other secretions, and lessened by their increase: this variation has especial reference to the increase and decrease of the cutaneous exhalation. As the urine is a secretion which attracts special attention at the bedside, it will be more minutely examined in the next Chapter.

266. *The Bile.*—This secretion has been not inaptly described as a soapy fluid, consisting of a solution of two peculiar fatty acids in combination with soda, forming the so-called salts glycocholate and taurocholate of soda. These salts constitute about nine-tenths of the solid constituents of the secretion, and contain in every hundred parts, 64 of carbon, 9 of hydrogen, 3 of nitrogen, and 24 of oxygen. The solid constituents of the bile are dissolved in about nine times their weight of water. The quantity of bile secreted in 24 hours has been estimated at from 17 to 54 ounces. If, in the absence of precise data, we take that quantity at one pint, and suppose it to weigh 9000 grains, it will follow, that as the solid constituents of the bile form one-tenth of the entire secretion, their weight will be about 900 grains. As, again, nine-tenths of these solid constituents consist of taurocholic acid, it follows that about 810 grains of this substance are secreted daily. Now 64 parts in 100, or rather more than three-fifths of this, consist of carbon. This will give for the carbon contained in the bile nearly 520 grains; and as the quantity of bile daily voided with the fæces does not exceed about a scruple in weight, more than an ounce of carbon must find its way into the intestines, be absorbed from their coats and carried into the circulating system, to serve as prepared fuel for the lungs. (§ 183, et seq.) A smaller quantity of hydrogen, amounting to about one-seventh of the quantity of carbon, would have to be similarly disposed of.

267. By the excretions of the lungs, skin, kidneys, and liver, the blood is freed from useless or hurtful matters. These excretions have

been examined separately; but it will be useful to consider them collectively, in order to show what share each bears in removing effete matters from the blood.

268. An average of fourteen experiments made by Dr. Dalton, on his own person, on successive days in the month of March gave the following results, the urine and fæces being ascertained by weight, and the proportion of the secretion of the skin and lungs by calculation.

The ingesta weighed 91 ounces. The egesta were as follows:

Urine $48\frac{1}{2}$ oz.; exhalation from the lungs and skin, $37\frac{1}{2}$ oz. (of which $30\frac{3}{4}$ oz. by the lungs, and $6\frac{3}{4}$ oz. by the skin); fæces 5 oz.

Of the ingesta, therefore, more than one-half was excreted by the urine, a third by the lungs, about a thirteenth by the skin, and an eighteenth by the bowels.

269. The bulk of these excretions, and consequently of the food and drink by which they are supplied, consists of water. Of the 91 ounces, no less than 76 consisted of water, which was contained in the several excretions in the following proportions:—

Urine $45\frac{1}{4}$ oz., lungs $20\frac{1}{2}$ oz., skin $6\frac{1}{2}$ oz., fæces $3\frac{3}{4}$ oz. Total, 76 oz.

It appears, then, that of the superfluous water contained in the blood, about five-eighths are removed by the kidneys, somewhat more than a fourth by the lungs, rather less than one-twelfth by the skin, and about a twentieth by the bowels.

270. The separation of water from the body is evidently an important use of these excretions, and it is easy to understand how one of these excreting organs may become vicarious of another in this respect. Thus, when the exhalation from the skin is increased by exercise or by any other cause, the urine is diminished; when, on the other hand, as in diabetes, the quantity of the urine is increased, the skin becomes dry and harsh. The functions of the lungs and skin, in like manner, are closely connected. When during exercise the skin is moist, the respiration is free; but if, the skin being dry, the circulation is at the same time excited, the respiration is difficult and frequent; but the moment moisture breaks out upon the skin, the lungs are relieved as by a charm, the respiration becomes natural and easy, and the body is freed from the load that oppressed it. The pedestrian will recognise the truth of this statement. It is the rationale of the “second wind” of those who take violent exercise.

271. The quantity of water removed by the bowels being comparatively small, has little effect on the other secretions; but if increased by the operation of a purgative, the urine is diminished, and in violent diarrhœa, and in cholera especially, is often entirely suppressed. The exhalation from the lungs is also probably affected by the quantity of the secretions poured out by the other organs.

272. Next to the water which is thus removed from the system, the most abundant material excreted is carbon. It is eliminated by the different organs in the following proportions:—

Lungs $10\frac{1}{4}$ oz., skin $\frac{1}{4}$ oz., urine $\frac{1}{2}$ oz., fæces $\frac{1}{2}$ oz. Total, $11\frac{1}{2}$ oz.

Hence the blood is purified of its carbon by the lungs, kidneys, skin, and liver. Of these organs, the lungs excrete so much the larger proportion, that no single organ, nor all of them jointly, can supply their place when their functions are much embarrassed. A certain proportion of the carbon contained in the fæces is furnished by the bile. The remainder has never formed a part of the circulating fluid.

273. The lungs and skin excrete carbon with oxygen, as carbonic acid; the kidney, with nitrogen and oxygen, and a small proportion of hydrogen, as urea and uric acid; and the liver, with oxygen, hydrogen, and comparatively little nitrogen, as cholic and glycocholic acids. As the carbon is similarly combined in the secretion from the lungs and skin, it is easily seen how the functions of the skin may become vicarious of those of the lungs. The relief afforded to the lungs during exercise by free perspiration probably arises in part from the excretion of carbonic acid; and the same may be said of the colliquative sweats in phthisis.

274. The close relation existing between the functions of the liver and lungs is proved by the frequent coexistence of diseases of those organs; that the one may be vicarious of the other is shown by the large size of the liver in the fœtus.

275. The essential constituent of the urine, urea, contains carbon in considerable quantity. Uric acid contains double as much, and it has been clearly proved that urea is directly derived by oxidation from this substance, which must be regarded as a product intermediate between the effete nervo-muscular tissues on the one hand, and urea on the other. Disordered function of the lungs or skin lead therefore to the accumulation of uric acid in the system.

276. Nitrogen is at one time absorbed, at another time exhaled, by the lungs; it is exhaled by the skin in variable, but probably not in large, quantity; it is nearly absent from the bile. The appropriate organ for its removal from the system is the kidney. In what degree other excretions may be vicarious of the kidney in this respect is not yet known. In uræmia the stomach attempts the elimination of urea.

277. The secretions of the skin, kidneys, and liver abound in salts; one of these organs may, therefore, to a certain extent, become vicarious of another in removing these matters from the system. The researches of Dr. Beale also render it probable that, in disease, certain saline substances are accumulated in large quantity at the seat of the disease, at the expense of some secretion of which they form a normal constituent. Thus chloride of sodium, found in excess in the sputa of pneumonia in the stage of hepatization, but absent from the urine, was restored to the urine on the subsidence of the disease.

278. In the similarity of the matters excreted by the several organs of the body, we recognise a provision for maintaining the normal constitution of the blood under the less severe functional disorders of those organs; while the efforts made by one organ to supply the place of another, probably account for some of the more familiar symp-

toms of disease. When these efforts are altogether unavailing, the constitution of the blood becomes seriously altered, and life itself is compromised.

279. The following table presents at one view the foregoing results of Dr. Dalton's experiments; the last three lines of the table being a rude approximation:—

	Pulmonary Exhalation.	Cutaneous Exhalation.	Urine.	Fæces.	Total.
Egesta . . .	36 $\frac{3}{4}$ oz.	6 $\frac{3}{4}$ oz.	48 $\frac{1}{2}$ oz.	5 oz.	91 oz.
Water . . .	20 $\frac{1}{2}$ oz.	6 $\frac{1}{2}$ oz.	45 $\frac{1}{2}$ oz.	3 $\frac{3}{4}$ oz.	76 $\frac{1}{4}$ oz.
Solid residue . .	10 $\frac{1}{4}$ oz.	$\frac{1}{4}$ oz.	3 oz.	1 $\frac{1}{4}$ oz.	14 $\frac{3}{4}$ oz.

Consisting of substances containing—

Carbon . . .	10 $\frac{1}{4}$ oz.	$\frac{1}{4}$ oz.	$\frac{1}{2}$ oz.	$\frac{1}{2}$ oz.	11 $\frac{1}{2}$ oz.
Nitrogen and other gaseous elements of urea and uric acid, exclusive of carbon . .			1 $\frac{1}{2}$ oz.	..	1 $\frac{1}{2}$ oz.
Salts, &c.			1 oz.	..	1 oz.
Residue of undigested matters				$\frac{3}{4}$ oz.	$\frac{3}{4}$ oz.

In the foregoing statement and tabular summary no notice is taken of the large quantity of oxygen gas which is received into the body through the lungs. This gas, which is as essential to the support of the frame as the food itself, by uniting with the effete textures, gives rise to compounds unfit for the maintenance of life, and these compounds being absorbed into the current of the circulation, seek their exit from the body through the excreting organs. If we suppose the weight of the body to remain unchanged, it is obvious that the oxygen received from the lungs in the act of respiration, added to the food consumed, must equal in weight the matters rejected from the body by the several excreting organs. The part borne by each excreting organ in this work of elimination is shown in the following table, which embodies the figures of two tables given by Vierordt in his 'Grundriss der Physiologie,' p. 192. 3952 grammes of food and drink are resolved into their elements, and, so to speak, traced into the excretions through which they escape from the body.

Received as Food.		Excreted by				
		Lungs.	Skin.	Kidneys	Bowels.	?
Water in food and drink .	2,818	330	660	1,700	128	..
Oxygen (from air 744, from food 38) . . .	782	651	7	11	12	101
Hydrogen from food . . .	19	..	..	3	3	13
Carbon „ . . .	282	249	3	10	20	..
Nitrogen „ . . .	19	..	..	16	3	..
Salts „ . . .	32	..	..	26	6	..
	3,952	1,230	670	1,766	172	114

With the exception of 101 parts of oxygen and 13 of hydrogen, which are supposed to combine to form water, the watery, gaseous, and saline elements of the food are here traced to the special organs by which they leave the body. It is worthy of remark that in the experiments from which these figures are deduced, the oxygen received in respiration is little less than a fifth part by weight of all the solid and liquid matters taken as food, and very nearly twice as great as the oxygen, carbon, hydrogen, nitrogen, and saline matters into which all that part of the food that is not water can be resolved.

280. Having now examined the function of digestion; the constitution of the blood, and of the various materials out of which it is formed; the secretions destined to further uses in the economy; and the excretions by which the blood is freed from useless or hurtful matters;—it remains to consider the mechanical arrangements by means of which the blood is renewed and purified, and subsequently distributed through the frame: in other words, to examine the functions of absorption, secretion, nutrition, and circulation.

It will be convenient to examine these functions in the following order:—the action of the heart; the motion of the blood in the arteries; the functions of the capillaries, of the veins, and of the absorbents.

2. PHYSIOLOGY AND GENERAL PATHOLOGY OF THE CIRCULATING SYSTEM.

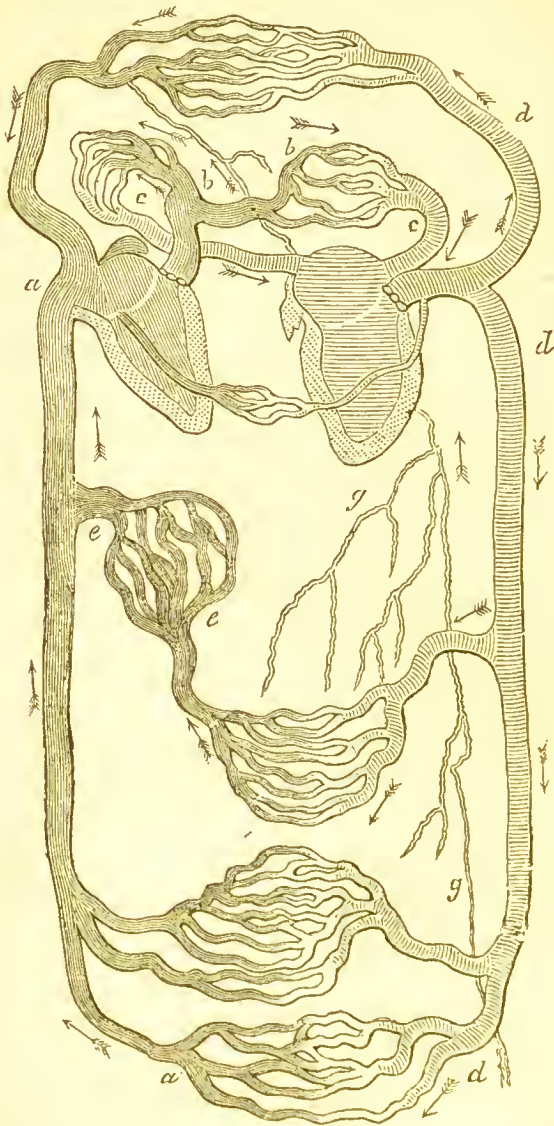
281. *The circulation.*—The heart is the centre of two incomplete circulations; one through the lungs, beginning at the right ventricle, and ending at the left auricle; the other through the body, commencing at the left ventricle, and ending at the right auricle; the two together forming a complete circulation, an uninterrupted stream of blood. A third circuit may be said to consist of the coronary arteries and vein, the former arising from the commencement of the aorta, the latter opening into the right auricle.

282. These three incomplete circulations consist of arteries, veins, and intermediate capillaries, all of which are always, and in all states of the living body, full of blood, though more or less distended as the quantity of the circulating fluid is increased or lessened.

283. Each of these incomplete circulations consists of an arterial trunk splitting up into numerous small branches, and of a venous trunk formed by the union, through the intervention of capillary vessels, of equally numerous small veins. This, too, is the character of the circulation throughout the body—arteries dividing into small branches, and corresponding small veins uniting to form venous trunks. But to this rule the vena portæ, and the minute circulation through the kidney, constitute exceptions. A general view of the circulation of the blood, including the portal system, is given in Fig. 1, in which *a d* represents the circulation through the body, *b c* the circulation through the lungs, *e e* the exceptional portal system, and *g g* the lymphatic and lacteal

system. The darker parts of the plan, on the left of the diagram, represent the venous system, and the lighter portions the arterial system.

Fig. 1.



The arrows indicate the direction of the stream of blood. The circulation through the heart is sufficiently apparent without the use of letters.

284. *The heart's action.*—The *heart* is the prime source, and chief cause, of the circulation through the blood-vessels. Expelling their contents more or less frequently, and more or less forcibly, in different persons, and in the same person at different ages and at different times, the ventricles send out at each contraction the blood which they have received through the auricles from the large venous trunks.

285. The average number of the heart's contractions in a minute may be set down at 70 for an adult male, and 80 for an adult female. The quantity of blood forced into the aorta at each beat of the heart in a healthy adult has been variously estimated at from two to five or six ounces; and the total quantity of the blood contained in the body at about twenty pounds (§ 202). Assuming two ounces to be the quantity expelled by the ventricle at each contraction, and twenty pounds to be the weight of the whole mass of blood, taking also the pulse at 70, and further assuming the whole quantity of the blood to be always in the current of the circulation, it is obvious that a given portion of blood could not complete its circuit through the body in less than two minutes forty seconds. Müller, however, estimates the time required at from one to two minutes, and Volkmann at $3\frac{1}{2}$ seconds in the newborn infant, and $65\frac{3}{4}$ seconds in the adult male. Positive experiments made by Hering, on the horse, prove that the circulation may be completed in 25 or 30 seconds; and the still more accurate experiments of Mr. Blake, on the same animal, show that it is completed in from 12 to 20 seconds. The experiments of the latter gentleman prove that in the dog the circulation may be completed in as little as nine seconds; that the time required for a poison to pass from the jugular vein to the lungs, was four seconds; from the jugular vein to the coronary arteries of the heart, seven seconds; from the jugular vein to the carotid artery, from five to seven seconds; and from the aorta to the capillaries, four seconds. Bernard has also proved experimentally that sulphuretted hydrogen gas introduced in solution into the jugular vein of a dog begins to be eliminated from the lungs in three seconds, and when introduced into the femoral vein of the same animal in seven seconds.

The estimated quantity of the blood must, therefore, be too high, and the quantity expelled at each beat of the heart too low; or, what is perhaps as probable, the whole of the blood contained within the body is not constantly in the current of the circulation, but remains for a longer or shorter period in the capillary vessels, subserving the functions of secretion and reparation. The observed difference between the velocity of that portion of the stream of blood which is in contact with the internal coat of the vessels, and of that which occupies their central axis, is also another element in the explanation of the difference between calculation and experiment.

286. The force with which the blood is expelled by the left ventricle has been estimated at somewhat more than four pounds.

287. *The arteries.*—The blood sent out by the heart is distributed to every part of the body by the arteries. The larger arterial trunks

are highly-elastic tubes, destitute of muscular fibre, admitting of expansion both in a transverse and longitudinal direction, and capable of adapting themselves to the volume of their contents. With each contraction of the heart they are both expanded and slightly curved; and the ingenious experiments of Poiseuille show that they undergo a positive increase of size, amounting, in the carotid artery of the horse, to $\frac{1}{23}$ of the capacity of the vessel.

The larger arteries, by yielding to the impulse of the blood and reacting upon it, cause a delay in its motion which would not occur in the case of rigid tubes; hence the pulse is somewhat later in the arteries remote from the heart, than in those near to it. This same elasticity also equalizes the motion of the blood in the smaller vessels, and causes it to flow in a continued stream. It also accounts for their empty state after death, the blood which they contain being forced into the veins. In old age this elasticity of the arteries is lost by the degeneracy or ossification of their coats.

288. Though the dilatation of the arteries cannot be seen by the eye, and has been proved to exist only by the use of ingenious instruments, the large arteries may be seen to throb. This change of position is owing to the longitudinal extension of the vessel with each beat of the heart. The vessel, in fact, is stretched and curved outwards by the forcible injection of blood; and if the finger be applied to the vessel with a tolerably firm pressure, this effort at change of place is felt. But this is not all; for the pressure exerted by the finger is resisted by the blood forced into the artery at each beat of the heart, and this resistance is also distinctly felt. These two things together, the change of place which the artery undergoes, and the resistance to pressure offered by the blood injected by the heart, constitute the Pulse, which will be more minutely examined in the next chapter.

289. The smaller arteries which communicate directly with the small veins, or from which the capillaries spring, possess two muscular coats, the inner longitudinal, the outer circular. In certain cases of obstructed capillary circulation these muscular fibres are hypertrophied, and may be distinctly seen under the microscope, as has been shown by Dr. George Johnson in the case of the minute arteries of the kidney. The arteries intermediate between the large trunks and their smaller branches, have more or less of muscular fibre in their structure as they approach to the one or the other class of vessels.

290. *The capillaries* are the smallest vessels in the body. They form a network, between the meshes of which the proper substance of each organ lies, or they are variously disposed so as to adapt themselves to the form and arrangement of the several tissues; and they establish a communication between the last divisions of the arteries, and the commencement of the veins. The small arteries which do not lose themselves in veins have no other termination, and the veins no other origin, but this; and there are no vessels terminating by open mouths. This continuity of the arterial and venous system through the interven-

tion of the capillary vessels is well shown in the annexed engraving of the small vessels in the interior of the villi of the small intestine (Fig. 2), in which the shaded vessels represent the veins, and the vessels in outline the arteries.

Fig. 2.



291. The capillaries are not, as has been sometimes supposed, canals drilled in the substance of organs, but distinct vessels, with a single membranous coat, through which the portion of the blood destined for secretion or nutrition finds its way.

292. The motion of the blood in the capillaries is chiefly dependent on the heart's action; its constant and equable flow on the elasticity of the arterial trunks; and some modifications, at present little understood, on the muscular contractions of the smaller arteries, and on the processes of secretion and nutrition going on in the parts to which the capillaries are distributed. The motion of the blood is less rapid in the capillaries than in the arteries, owing to the great resistance offered by the capillaries themselves—a resistance calculated at from two-thirds to three-fifths of the force of the heart.

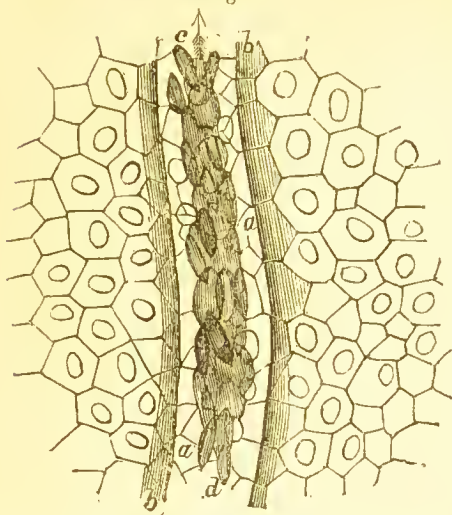
293. In health, the capillaries subserve the important function of nutrition by allowing the ready exsudation through their thin membranous wall of the materials which the several tissues require for their growth and repair; in disease, they play an important part in the changes known as *inflammation, irritation, and congestion*.

294. The minute arteries and capillary vessels undergo some marked changes in health, which changes enable us to understand disease. The emotion of shame brings a blush to the cheek; the emotion of fear blanches it. Warmth reddens the skin; cold, on the other hand, makes it pale. Exercise, likewise, reddens the surface; and continued rest restores it to its usual colour. Now, the blush of shame, the redness produced by heat, the glow of exercise, and the pallor produced by fear, by cold, or by continued rest, all depend upon changes in the circulation through the small arteries and capillary vessels.

295. There are three distinct ways in which it is conceivable that this increased or diminished redness of the surface, due to changes in the small vessels may be brought about:—the rapidity of the circulation may be increased or diminished, so that more or fewer red particles (*c, d*, Fig. 3, p. 68) may traverse the vessels (*b*) in the same time; or that portion (*a*) of the calibre of the vessels which is nearest to their coats, and which has been shown in tranquil states of circulation to transmit a colourless fluid, may admit the red particles; or the size of the vessels may be increased or diminished. Observations made on the circulation of the blood in the frog's foot (Fig. 3) have demon-

strated the soundness of all these suppositions. The velocity of the circulation is seen to vary;

Fig. 3.



the outer portion of the calibre of the vessels to admit red particles; and the size of the vessels to increase or decrease.

296. In the examples just adduced we have three distinct causes of what is called determination of blood to the skin: in the first case, an emotion of the mind; in the second, a local application to the vessels themselves; in the third, the increased action of the heart. From the first example it appears that the state of the small vessels may be changed without any increased ac-

tion of the heart; for if the enlargement were due to that cause, the blush would not be confined to the cheek; the second shows that local applications will affect them in the same way, without disturbing the heart's action; and the third proves that precisely the same result may follow from the stronger and more frequent contraction of the heart itself. The cases in which paleness of the skin occurs are equally instructive, proving, as they do, the local effect of emotion in producing a change of an opposite kind in the condition of the small vessels, the equally local effect of cold, and the remote effect of a tranquil state of the heart's action.

297. It has been seen that one change which these minute vessels undergo when the colour of the skin is heightened, is that of dilatation. How is that dilatation caused? It has been stated that the small arteries have muscular coats. Their enlargement, therefore, must be due either to the force of the heart's contraction, or to the temporary relaxation of the contractile tissue. In the last example adduced, that of the skin becoming red from exercise, the small vessels are obviously dilated by the additional quantity of blood forced into them by the heart; but in the first two cases, the cause is strictly local, and in no way dependent upon the heart's action. Here, then, we have examples of the small arteries and capillary vessels dilating without any force from behind to fill them: in the one case, in consequence of an emotion; in the other, of a local application. But this local application itself (heat) is of a nature to expand the substance, whether living or dead, to which it is applied; therefore the effect, in this case, might be regarded in the light of a mere physical change.

and not as a proof of any vital expansion of the vessels. This being granted, there would yet remain in the act of blushing an undeniable proof of a *vital* expansion of the small arteries, due to an influence conveyed through the nerves, and operating to produce a momentary diminution or suspension of their contractility.

298. As the capillary vessels consist of a single membranous coat, without muscular fibres, it is probable that they are passive in the local changes which occur in the circulation of the blood, and that the rapidity of the circulation through them is determined by the state of the small arteries on the one hand, and the greater or less vigour of the processes of secretion and nutrition on the other.

299. The cells, which are the parts immediately concerned in the processes of secretion and nutrition, are endowed with vital properties that exercise upon the capillary circulation, an influence probably not inferior to the whole *vis a tergo*. That the cells do exert such an influence, is proved by the entire arrest of the circulation through the capillaries of the kidney, as a consequence of the complete destruction of the cells lining the tubes which they supply. (Dr. George Johnson.)

300. It appears, then, that, in one instance at least, there is no other way of accounting for the enlargement of the minute arteries than by a diminution or momentary suspension of their contractility. Now, in inflammation, this same enlargement of the small arteries occurs; and the important question arises, is it due to the same cause? A grain of sand gets into the eye, and in a short time the vessels of the conjunctiva become filled with red blood, and obviously enlarged. Here there is no action of the heart to account for the enlargement of the vessels; for the other eye, which is equally affected by the general circulation, is not inflamed. The change, then, is strictly local. It cannot arise from an increased action of the arteries leading to the inflamed part, for any contraction of these arteries must have the effect of diminishing the quantity of blood passing through them. What, then, can give rise to the dilatation of the small arteries but a temporary loss of their contractility? and this loss must be due to an influence transmitted through the nerves to the coats of the vessels. Again, if ice be applied to the finger, the immediate effect is to contract the vessels; but as soon as it is removed, the pale skin becomes red; redder than the surrounding skin. Here, again, the influence of the heart's action in injecting the capillaries is out of the question, and we have a strictly local effect, consisting in contraction, followed by dilatation.

301. The same contraction of the small vessels which is produced by cold, has been shown, by experiments under the microscope, to follow the application of mechanical and chemical irritants, this contraction being succeeded, after a variable interval, by dilatation. Hence the objection which might be urged against this example, viz., that the contraction is a mere physical effect of cold, loses its force, and the general fact remains, that agents capable of exciting inflammation first

act by contracting the small vessels, and that this contraction is followed by dilatation.

302. Can this be explained? Perhaps thus. It is a general law that stimuli applied to any part of the body call that part into action for a time, and that action is dependent upon nervous influence; but the nervous influence suffers exhaustion proportioned to its intensity and duration, producing in the part affected a condition the very reverse of that which existed when the nervous power was in full force. In the case now under consideration, the stimulant determines the nervous influence to the small vessels, and the proper functions of those vessels—viz., their contractility—is for the time called into full play; exhaustion ensues, that function is paralysed, the vessels lose their contractility, and yield to the blood which flows into them.

303. Microscopic observations (such as those of Mr. Paget on the bat's wing) have further shown that during this first period of contraction the flow of the blood is retarded; but that, when the vessels become dilated, the circulation is accelerated, to be again retarded after an interval of time. The small vessels in becoming dilated are also stretched and twisted, and here and there even become varicose. This dilated and varicose state of the small vessels is well shown in the annexed engraving from Valentin, after Harting (Fig. 4). In consequence of this increase of size, the vessels admit a larger number of red particles; and vessels which previously conveyed

Fig. 4.



only colorless blood, now become carriers of red blood.

304. The changes which take place in an inflamed part are not long confined to the small vessels. The larger arteries and veins suffer the same dilatation; and if the inflammation prove severe and extensive, the arterial trunks themselves participate; and thus large portions of the body—a hand, a foot, a limb, or an internal organ—become so many congeries of enlarged vessels, which contain a larger quantity of blood than those of the corresponding part of the body. Thus, if severe inflammation attack one hand, it contains much more blood than the other; the radial artery of that side is evidently enlarged (partly from loss of contractility, partly from increased action of the heart); and if a vein of that side be opened, it will pour forth much more blood than the vein of the opposite side.

305. The increased action of the heart, which occurs in all acute inflammations, sends blood in greater quantity to every part of the frame, and gives rise to *symptomatic fever*. If the nervous system suffer much, it is accompanied with that disturbance of its functions

known as irritation, and we have *constitutional irritation*, or *irritative fever*; if the system have been long used to the stimulus of ardent spirits, the loss of the accustomed stimulus, added to the increased flow of blood to the vessels of the brain, may give rise to *delirium tremens*; and should the power of the constitution have been previously exhausted, the fever assumes the *typhous* type in place of the milder form which it takes in the strong and robust.

306. It appears, then, that in every change which the smaller vessels undergo, the heart or the small vessels themselves are first affected; but that in acute inflammation both are ultimately involved, the heart sending forth more blood, and the small vessels receiving more. The heart's action, which is *muscular contraction*, is increased; the action of the small arteries, which is also muscular contraction, is diminished. There is, then, no such thing as increased action of the arteries, in the sense in which that term was formerly used: that which used to be called *increased* action, is, in fact, *diminished* action.

307. The account just given of the condition of the small arteries, veins, and capillaries, and of the circulating system generally, in inflammation, though, perhaps, sufficient for practical purposes, would lead to error, if adopted as a complete *theory of inflammation*. We have yet to take into account the organic tissues, to the functions of which the whole system of vessels is subservient—the arteries and veins as carriers of the blood to and from them, and the capillaries as the intermediate and connecting vessels through the membranous walls of which the tissues attract the materials of their growth and repair, and the fluid solvent of such portions of them as have served their purpose in the economy, and become effete.

308. The secreting cells which constitute the bulk of these tissues play a very important part in the production of inflammation. When the inflammation originates in an increased action of the heart, the function of secretion in the part affected is deranged by the turgescence of the vessels. The increased quantity of blood imposes on the secreting cells an amount of work which they are unable to perform. Hence, the elements of the secretion accumulate in the blood, and the original turgescence of the vessels is increased and perpetuated. On the other hand, in those cases where the first link in the chain of causes is an accumulation in the blood of the elements of an important secretion, say of the bile or urine, the second link is the rapid destruction of the secreting cells, the third link the arrest of the circulation in the capillaries, and the last link of the local chain the dilatation of the small arteries. An increased action of the heart is all that is necessary to complete the idea of inflammation as it commonly presents itself.

309. An excellent illustration of the share which the secreting cells have in bringing about the phenomena of inflammation is afforded by the kidney, in inflammation of that organ. The first link in the chain of causes is a rapid desquamation of the epithelial cells lining the uri-

nary tubes; the detached cells clog the tubes; the blood in the capillaries is arrested, blood or serum is extravasated from the Malpighian tufts, and inflammation is set up.

310. The processes of nutrition and inflammation are strictly analogous. In healthy nutrition, the cells of the organic tissues attract from the blood, through the walls of the capillary vessels, the materials of growth and repair; while the liquor sanguinis, from which these materials have been abstracted, having dissolved the *débris* of the effete textures, is restored to the circulation by the absorbents and the veins. In adults, under ordinary circumstances, the formation of new tissues exactly counterbalances the destruction of the old; but during the period of growth, and in certain parts of the system, as the womb and breast, to meet an occasional demand, the process of nutrition is more active than the work of destruction. The same thing happens in some cases of subacute inflammation, which terminate in hypertrophy. In healthy inflammation, too, as has been proved by microscopic examination, the capillaries under the increased attraction of the tissues pour out liquor sanguinis, or coagulable lymph rich in fibrine, and capable of developing cells by which the destructive effects of inflammation are repaired, or the tissues increase in bulk and firmness.

311. The enlargement of the capillary vessels in inflammation, then, is quickly followed by effusion. When the seat of inflammation is the cutis, as in the case of a burn, serum is thrown out from its surface under the cuticle, and a blister rises: when a mucous or serous membrane is inflamed, fluid exudes from its surface: when the cellular membrane is its seat, the effusion takes place into its cells. This effusion varies with the constitution and state of system, the condition of the part, and the intensity and nature of the inflammation; and may present every degree of variety between a lymph abounding in fibrine, and a lymph rich in granules or corpuscles.

312. The lowest degree of inflammation in any of these parts merely increases the quantity of their natural secretion—of serum, in the case of the serous membrane—of mucus, when the mucous surfaces are inflamed. A higher degree of inflammation causes the effusion of coagulable lymph (the fibrine of the liquor sanguinis) or of pus. The increased natural secretion of the serous membranes is *dropsy*, or, when of limited extent, *œdema*; that of the mucous membranes, *flux*. Both these membranes, when the inflammation is more intense, pour out fibrine or pus. Thus the inflamed pleura or peritoneum secretes fibrine, which glues its surfaces together, and, becoming organized, forms permanent adhesions; the mucous membranes, too, in states of severe inflammation, pour out coagulable lymph of such tenacity as to assume the shape of the tube in which it is formed, and even to be mistaken for the detached lining membrane itself. This occurs in the larynx, in croup; in the bronchial tubes, in a peculiar form of bronchitis; in the intestines, in dysentery; in the kidneys, in inflammatory affections of those organs. Of purulent secretion from serous membranes, empyema

is an example ; and of the formation of pus from mucous surfaces, purulent ophthalmia affords an illustration.

313. When the capillaries, dilated in inflammation, return to their natural size, and any fluid which may have been poured out into the surrounding textures is absorbed, the inflammation is said to terminate by *resolution* ; when blood is thrown out, by *hæmorrhage* ; when serum, by *effusion* ; when fibrine or coagulable lymph is formed and organized, by *adhesion* ; when pus is effused, by *suppuration* ; when the part dies, by *gangrene*. Inflammation of mucous surfaces or of exposed portions of cellular membrane, accompanied by the effusion of pus, and the more or less rapid removal of the part affected, constitutes *ulceration*. There is also a peculiar consequence of inflammation nearly allied to suppuration, and designated as *ramollissement*, or softening.

314. The generic term inflammation is often qualified by other words indicative of its character. Thus we have *œdematous* inflammation, or inflammation terminating in, or accompanied by, *œdema* ; *adhesive* inflammation, or inflammation terminating in *adhesion* ; *suppurative* inflammation, or inflammation issuing in *suppuration* ; *gangrenous* inflammation, or inflammation ending in *gangrene*. The terms *acute* and *chronic*, *healthy* and *unhealthy*, *common* and *specific*, *phlegmonous* and *erysipelatous*, are also used to designate varieties of inflammation.

315. When inflammation attacks the cellular membrane, whether in the skin or in the parenchyma of internal organs, it takes different courses according to its intensity. If the inflammation be slight, it terminates in *resolution* ; if more severe, *effusion* may take place ; if more severe still, *suppuration* ; if still more intense, *gangrene*. If a portion of the cellular membrane die, or if the effusion of blood, serum, or fibrine, be so large in quantity as to distend and break down the cellular tissue, pus is thrown out in small detached portions, which, by the solution of the intervening parts, coalesce, so as to form one single collection of purulent matter, round which fibrine or coagulable lymph is thrown out, becomes organized, and constitutes a *cyst* or *sac*. This collection of pus in a cavity, bounded by a wall of effused and organized fibrine, is called an *abscess*—a term which, like the term inflammation, is qualified in practice by phrases indicative of its character or progress, such as the *acute* or *phlegmonous* abscess and the *chronic* abscess.

316. Sometimes the constitution is not strong enough to build up and organize a wall of fibrine about the dead part, and then the pus finds its way into the surrounding cellular texture, and a *diffused abscess* is the result ; or the inflammation is of a peculiar character, as in erysipelas, and suppuration takes place with little or no adhesive inflammation.

317. In rare instances the pus which has been thrown out is absorbed, and the abscess is said to be *dispersed* ; but in the majority of cases fresh pus is formed, the abscess increases in size, and presses with augmented force on surrounding parts. Some of these parts yield to the pressure, and then the abscess is said to *point*. If the abscess is

near the surface, the skin itself offers the least resistance; it is therefore protruded, and stretched more and more till it bursts.

318. When the matter of an abscess is discharged, the cavity which contained it contracts, the lining of fibrine is cast off, and the walls become a suppurating surface, upon which fresh fibrine is effused. Part of this fibrine becomes organized by vessels, which either form within it, and then connect themselves with those of the surrounding parts, or are gradually extended into it from those parts. These newly-organized portions of fibrine are arranged side by side as small rounded vascular points, called *granulations*. From the surface thus created pus is secreted, which serves to protect the granulations from the air. When the granulations approach the surface, the pus hardens into a *scab*, which serves to protect the parts beneath from the air. In healthy persons the granulations are numerous, small, and florid, and coated with pus of a creamy consistence, known to the older surgical writers as *laudable pus*. Unhealthy granulations, on the other hand, are large, pale, and flabby, and discharge a thin and flaky pus. The various appearances presented by the granulations, and the changes which they undergo with alterations in the general health, form a subject of interesting and instructive study to the surgeon.

319. *Healing*.—When the vascular tissues are divided, and the two edges of the wound are brought close together, and retained in contact, the wound may heal without leaving any scar, and the part is said to have healed by the *first intention*.

But the part may not heal in this simple way: the wound may gape, and an open sore or *ulcer* be formed, presenting the same granulations as the walls of an abscess which has burst. These granulations, once completely organized, secrete fresh coagulable lymph, and this in its turn is moulded into new granulations; and thus the ulcer is at length filled up to a level with the surrounding skin, and is protected by a scab; a small portion of new tissue is meanwhile formed between the edges of the wound which gradually contract as the surface heals. Ultimately the scab falls off and exposes the new-formed tissue. The scar or cicatrix, which is at first red, in process of time becomes pale, and, when the cicatrix is on the free surface of the body, is converted into true skin.

320. As a general rule, abscesses, whether in the integuments of the trunk or in the solid viscera of the body, tend towards the surface; but to this rule there are exceptions. If, for instance, an abscess form in an internal organ, such as the liver, its firm parenchyma may offer more resistance than the loose texture of an adjoining intestine: the abscess presses upon the coats of the intestine; adhesive inflammation is set up between the two layers of serous membrane, they are glued together by coagulable lymph, the peritoneum and the coats of the intestine thus become one continuous texture through which the abscess, continually increasing, forces its way, till it bursts and discharges its

contents. Sometimes the course of an abscess is more circuitous, as when an abscess of the liver finds its way through the diaphragm, and discharges itself into the air-passages of the lungs. Sometimes, again, an abscess in a solid viscus discharges itself into the serous cavity which surrounds it. Abscess of the lung, opening into the sac of the pleura, is an example in point. As a general rule, the matter of an abscess takes the shortest course to its place of discharge. The most common exception to the rule is in the case of collections of matter formed beneath fasciæ, by which they are bound down and diffused.

321. *Ulceration* is very analogous to suppuration. Ulceration of the skin, for instance, begins with inflammation, and is followed by effusion of serum or pus. The vesicle or pustule breaks, and leaves an uneven surface, covered with flakes of lymph, and moistened with pus. This surface may either heal in the way just described, or it may extend and enlarge by the destruction of the skin and subjacent textures, running a course more or less rapid, according to the intensity of the inflammation. In ordinary cases the parts are removed gradually and almost imperceptibly; in other instances with great rapidity, when the ulcer is called *phagedenic*; in other instances, again, the inflammation is so intense as to cause the death of considerable portions of the cellular membrane, in which case it is called a *sloughing* ulcer; or, lastly, rapid ulceration may be accompanied by gangrene, constituting the so-called *sloughing phagedena*, or *hospital gangrene*. Ulcers are further designated as *acute* and *chronic*; *healthy* and *unhealthy*, *inflamed*, *indolent*, and *irritable*; *congestive*, *varicose*, *fistulous*, &c.

322. *Gangrene* is one of the terminations of inflammation; and the death of a limited portion of the cellular or other texture is an occasional cause of abscess. The common boil is an example of a more extended death of the cellular tissue. But gangrene may take place without leading to the formation of an abscess. It may attack a limb, in consequence of the extreme debility of the circulation in it, and beginning in the foot, extend upwards, involving the entire circumference of the limb, until it reaches a part where the circulation is active enough to allow of adhesive inflammation, when coagulable lymph will be thrown out in a circle, dividing the sound from the dead parts; granulations will be formed, pus effused, and at length a natural amputation of the dead member will be effected. Thus, in consequence of the different effects produced by different degrees of inflammation, and of the various secretions thrown out in different stages of the process, the body is enabled to set limits to its own diseases, and to repair the most severe injuries.

323. Sometimes gangrene takes place without inflammation, as in a limb of which the arteries are ossified, or in cases of poisoning with ergot of rye: this is distinguished as *dry* gangrene. A form of gangrene, from extreme languor of the circulation in the lower extremities, is peculiar to persons of advanced age, and is known as *senile* gangrene.

324. The most common constitutional or predisposing cause of gan-

grene is debility ; the most common exciting causes are severe mechanical injury, the action of violent irritant substances, pressure, and intense cold ; the immediate or proximate causes are a deficient supply of arterial blood, impediments to the return of the venous blood, and injury or division of the nerves. The term *mortification* is commonly used as synonymous with gangrene ; and the word *sphacelus*, or *slough*, is generally employed to characterise a part not susceptible of being restored to life, and which must be thrown off from the body.

325. A complete description of inflammation, including its causes, its phenomena, its terminations, and the various modifications which it undergoes in different states of health, in every variety of constitution, and in every texture of the body, would exceed the limits of this work, and properly belongs to the province of the surgeon ; but there is one species of inflammation which, on account of its great importance, must not be passed over in silence, namely, erysipelatous inflammation.

326. *Erysipelatous inflammation* is characterised by its tendency to spread over the skin or over the surface of membranes, by its attacking different parts of the body, either simultaneously or by *metastasis*, and by its contagious and infectious character. When its seat is the skin, the subjacent cellular tissue is more or less implicated, and the specific character of the inflammation is shown by the lymph which is formed being incapable of organization. In the milder forms of erysipelas, as in that which often attacks the face, the disease scarcely extends beyond the skin itself, when it is called *simple* or *cutaneous* ; in the more severe forms, however, the cellular membrane is implicated, when the disease is known as *phlegmonous erysipelas*.

327. Closely allied to erysipelas of the skin, and intimately connected with it, is that inflammation of the peritoneum which occurs in puerperal fever, associated with acute inflammation of the veins of the uterus and of other parts of the body, with purulent deposits in the joints, and in the liver, lungs, and other viscera. The coexistence of erysipelas on the skin with puerperal fever, of erysipelas on the infant and puerperal fever in the mother, and the occurrence of diffuse erysipelatous inflammation as the consequence of wounds inflicted in the examination of bodies of women who have died of puerperal fever, fully establish this connection.

328. *Congestion* is nearly allied to inflammation. It consists in a passive enlargement of the small vessels, without the symptoms of inflammation or the effusion of lymph or pus, but sometimes attended by an increase of the natural secretion of the part. This enlargement of the vessels is the effect of debility, and as such is apt to continue in parts in which the symptoms of acute inflammation have been subdued. It is of common occurrence in the aged, and in persons exhausted by suffering. In addition to the capillary vessels, it involves chiefly the veins, whilst inflammation has its principal seat in the arteries. Hence the term *venous congestion*. Pressure is a common cause of this state : thus we have congestion of the veins of the leg after long standing,

congestion of the vessels of the head from wearing a tight cravat, and congestions in the lungs from impediments to the respiration.

329. *Congestion of the internal organs* is of very frequent occurrence, and plays an important part in the development of organic disease, and in the hæmorrhage and dropsy which so frequently accompany it. Some of the causes of visceral congestion, such as cold applied to the surface, a continued dry state of the skin in febrile disorders, the plethora induced by a rich and stimulating diet combined with insufficient exercise, and hypertrophy of the left ventricle of the heart, are very simple and obvious. The continued action of these causes leads sooner or later to organic disease in some predisposed organ, such as the brain, the lungs, the liver, or the kidney. Hypertrophy of the left ventricle of the heart gives rise to organic disease of several of those organs.

330. But besides this general internal congestion, leading to organic disease of some one of the congested organs, there are instances of congestion confined to a single organ, and forming one link in a chain of very interesting and instructive pathological changes, analogous to those already described as belonging to inflammation, §§ 299 and 308.

331. If we take the kidney as an example, the primary source of the congestion would seem to be, in all cases, either an impure condition of the blood (the impurity consisting in the excess of some element which ought to be eliminated by the kidney), or a process of desquamation strictly analogous to that which takes place on the skin in scarlatina. In either case, the first morbid change consists in desquamation, or separation of the secreting cells. The cells are rapidly thrown off in large numbers, so that the tubes become clogged, and further secretion thereby impeded; or the tubes become altogether denuded of their cells. This leads to congestion of the intertubular capillary vessels, extending backwards to the Malpighian capillaries, which, according to the degree of congestion, pour out blood or serum; or, first blood, and then serum. The blood thus poured out is partly discharged mixed with the urine, and partly separated into its constituent parts; the fibrine, and part of the colouring matter, coagulating in the tubes, and being voided in the form of cylindrical moulds. In simple desquamation of the kidney, these moulds have epithelium scales adhering to their external surface, but without oil globules. In more severe forms of disease, especially where the secreting tubes are denuded of their cells, oil globules are found blended with the epithelium scales. The local congestion thus set up, if extensive or of long continuance, constitutes an obstacle to the movement of the blood, which ultimately affects the centre of the circulation, and leads first to violent action, and then to hypertrophy, of the left ventricle. After a time, this state of hypertrophy causes congestion of other internal organs, with hæmorrhages and effusions of serum; indeed, the train of symptoms which is well known to follow hypertrophy of the heart due primarily to other causes. (Dr. George Johnson.)

332. Similar changes occur in asphyxia, as was shown by the late

Dr. John Reid. The carbonic acid accumulating in a quantity too large to be eliminated by the secreting apparatus of the lungs, turgescence of the capillary vessels ensues, and death supervenes before inflammation has had time to develop itself.

333. *Hæmorrhage* is a common consequence of congestion, when it is termed *passive hæmorrhage*; but it sometimes appears to flow immediately from the arteries, when it is termed *active*. Sometimes in hæmorrhage from the lungs, it is caused by the rupture of an artery; at other times, as in hæmorrhages from the stomach and bowels, the blood seems to exsude through the coats of the vessels. We may also have hæmorrhage into the ducts of secreting organs, such as the liver or kidney. In scurvy and in putrid fevers the hæmorrhage is due partly to weakness of the vessels, and partly to thinness of the blood. Hæmatemesis, melæna, and hæmorrhoids, are examples of passive hæmorrhages. The copious discharge of red blood from the bowels, traceable by the use of the speculum ani to a small spot in the mucous membrane of the intestine, is a good example of active hæmorrhage.

334. *Nutrition and secretion*. These two processes are essentially the same; for each consists in the development of simple cells endowed with independent vitality, and capable of assimilating from the blood their own peculiar fluids.

335. The *secreting organs* assume various forms: they consist essentially of a basement membrane coated with epithelial cells, and covered externally with a network of blood-vessels.

336. In *nutrition* each separate cell runs through its course of gradual development and decay, the products of its decomposition (of which the first in order, as in all forms of decay, is carbonic acid) being absorbed into the blood, and eliminated from the system by appropriate excreting organs.

337. In *secretion*, too, the epithelial cells which form the essential secreting organ are similarly built up, arrive at maturity by the absorption of materials constituting the secretion, and then break up and decay; but the products of this decomposition of the cells, blended with their contents, instead of being absorbed into the blood-vessels, are poured into tubes fitted for their reception and discharge.

338. The fluids poured out by the secreting organs are known as *excrementitious* and *recrementitious*; that is to say, they are expelled from the body as hurtful, or retained to serve some useful purpose in the economy.

339. To the class of *excrementitious* matters belong the urine, the sweat, the water and carbonic acid exhaled from the lungs, a small portion of the bile, the secretions of the several mucous membranes of the body, the menstrual discharge, and the hair, cuticle, and nails. Milk and semen differ from other excrementitious matters in not being injurious to the system.

340. Of the *recrementitious* secretions some (as the secretions of the salivary glands, stomach, liver, and pancreas) subserve the process of digestion; others (as the tears, and the watery secretion of the Malpighian tufts of the kidney) serve to cleanse the surface of the eye and the urinary tubes respectively; others again (as the sebaceous secretions of the skin, the mucus of the mucous membranes, and the aqueous secretion of the serous membranes), protect from injury, and facilitate the movements of, the parts which they moisten.

341. Another secretion not destined to immediate expulsion from the body consists of the fat which is deposited in the adipose cellular tissue, giving roundness to the form, facilitating motion, protecting the external parts from cold, and serving as a store of nourishment.

342. The fat forms an example of secretion into cells. Examples of secreting organs in the form of membranes are the serous membranes (the pleura, the peritonæum, the arachnoid, and the synovial membranes of joints); the mucous membranes (that lining the alimentary canal and the parts communicating with it, and that lining the urinary passages and organs of generation); and lastly, the skin, a compound organ containing a variety of secreting glands.

343. *Glands*, in the usual acceptation of the term, are of three kinds—1, collections of blood-vessels, as the spleen and the placenta; 2, lymphatic glands, which are similar congeries of lymphatic vessels; and 3, true secreting organs. These latter are of two kinds, the one secreting into cells a fluid destined to be again removed by absorption, *e. g.*, the thymus and thyroid glands; the other furnished with ducts for the discharge of fluids, which either subserve other purposes in the economy, or are thrown off as useless. These organs all consist of an excretory duct, which, if we trace it backwards from its trunk, divides into branches, and these again into others of smaller size, until the smallest terminate in blind extremities of various shapes, called cells, follicles, acini, &c. On the outside of these minute terminations, the capillary blood-vessels ramify, and the appropriate secretion permeating the invisible pores of these vessels, drops into the cell, follicle, or acinus, and thence flows into the duct. The blood which is not used in the secretion is returned by appropriate veins.

344. In the kidney, the secreting apparatus is more complicated, consisting of a tuft of vessels (the Malpighian body), which secrete water, and of tubes lined with epithelium which eliminate the solid constituents of the urine; the water serving to wash out these solid matters—an operation assisted, in reptiles and fishes, and probably in mammalia also, by the cilia which line a portion of the tubes.

345. Secretion, like nutrition, is subject to differences in degree and in kind. The natural secretion of a part is augmented by increased flow of blood, provided it be not excessive. Thus perspiration follows exercise, and diarrhœa ensues on slight inflammation of the mucous membrane of the bowels. It may also be increased by debility of the

capillary vessels, when the circulation is languid, as in the cold sweats following a fainting fit or preceeding dissolution. These two causes of increased secretion—augmented flow of blood, and weakness of the capillary vessels—combine to produce the night sweats of hectic fever. On the other hand, the natural secretion of a part is diminished when it receives a small quantity of blood, as is the case with the skin in the cold stage of fever; or when it receives much more than its usual quantity, as in the hot stage. In this latter case, as soon as the fever subsides, and the quantity of blood sent to the skin is diminished to a certain point, the sweating stage begins. The nerves, too, have great effect on the secretions, as is seen in the flow of tears from grief, joy, or rage, and in the effects of fear or anxiety on the skin, breasts, kidneys, and bowels. Mental emotion, however, checks some of the secretions. Thus fear, which increases the secretion of the skin, checks that of the salivary glands.

346. But the secretions vary in *kind* as well as in degree; in other words, they are liable to a variety of morbid changes. Thus, the serous membranes, which in health secrete a watery mist or vapour, under a certain degree of inflammation, pour out serum, and dropsy results; a higher degree causes effusion of liquor sanguinis; a different and perhaps higher degree, of pus. The mucous membranes, according to the degree of inflammation, secrete a glairy fluid, tough mucus, pus, or fibrine, or all these secretions blended in different proportions, as may be observed in the course of a severe attack of catarrh.

347. Very serious consequences result from the suppression of secretions, or from the non-elimination of some of their important constituents. Jaundice affords an example of the suppression of an entire secretion, followed by symptoms of constitutional disturbance. The non-elimination of *urea*, or of its combinations, by the kidneys, is an example of the suppression of an important constituent of the urine, followed in slight cases by erythematous swellings and boils; in more severe ones, by gout and rheumatism; in extreme cases, by fatal oedema.

348. What has been said of the similarity of structure in the several secreting organs will prepare us to view, without much surprise, the assumption by some of the secreting organs of the functions belonging to others. This is termed the *metastasis* of secretions. Familiar examples of this phenomenon are, the secretion of urine, or of a fluid nearly resembling it, by the skin and several of the mucous surfaces; of bile, by almost all the secreting organs, as in jaundice; of milk, by the skin and lungs; and of the menstrual flux, by the vessels of the nose, lungs, and stomach, and from the surface of ulcers.

349. *The veins*.—The veins are larger than the arteries, and have no elastic coat. The larger veins of the extremities also differ from the arteries in being provided with valves to prevent regurgitation, and give support to the column of blood which they contain.

350. The circulation through the veins is effected mainly by the im-

pulse of the heart continued through the capillaries. It is also assisted by the contraction of the muscles of the extremities, which, aided by the position of the valves, presses the blood towards the heart. The movement of blood in the great veins near the heart is further accelerated by the act of inspiration, and partly, as some suppose, by the suction of the heart itself.

352. At each inspiration the cavity of the chest is enlarged by the descent of the diaphragm, and by the elevation and tilting outwards of the ribs. The enlargement thus effected tends to produce a vacuum, which must be prevented by the entrance of air, of blood, or of both. That the motion of the blood in the large veins is thus accelerated is shown by experiments, and by the phenomena attending the admission of air into a wound in the larger venous trunks. It has also been shown experimentally that at each systole of the heart a tendency to a vacuum exists in the pericardium, which is prevented by the blood of the large veins distending the auricles.

353. The assistance given to the venous circulation by inspiration is somewhat counteracted during expiration, when the pressure exercised on the contents of the chest causes regurgitation of blood into the larger veins. There is, however, a balance in favour of the circulation, the effect of inspiration being greater than that of expiration.

354. When the right auriculo-ventricular valve allows of regurgitation, the blood flows back into the descending cava and jugular vein, causing a *venous pulse*.

355. Experiments have shown that poisonous substances introduced into wounds soon find their way into the veins. This proves either that the veins themselves absorb, or that the capillaries which terminate in the veins possess this power. It is through this absorption into the circulation that poisons act; hence the efficacy of ligatures applied above wounds, of the abstraction of the blood below the ligature, and of the application of cupping-glasses, which answer the double purpose of a ligature and evacuator.

356. *Absorption* is of two kinds; the absorption of fluids and the absorption of solids, or interstitial absorption. The capillaries and veins have the property of absorbing fluids; but the lacteals and the absorbents, properly so called, are also provided, the one for the absorption of the chyle from the intestines, the other for the absorption of lymph from every part of the body.

357. Absorption is certainly effected in more ways and by more means than one. Living and dead tissues allow the passage of fluid and gaseous matters through them. This is called *imbibition*.

358. If two gases are in contact with the moist surfaces of a bladder, one being within it and the other external to it, both will permeate the bladder till they are equally mixed. A gas, likewise, will permeate a moist bladder to mix with a fluid within it. This takes place in the lungs. Again, if a vessel be filled with water, and a moist bladder be

tied over its mouth, so that the fluid is in contact with the bladder, and a salt be strewed over its surface, it will be dissolved by the water which permeates the pores of the bladder. If a tube filled with a solution of salt or sugar, and closed by a piece of bladder, be placed in water, the water permeates the bladder, mixes with the solution, and rises in the tube. At the same time a portion of the fluid contained in the tube traverses the bladder in an opposite direction, and this interchange takes place till the fluids on both sides of the bladder have become homogeneous. If the arrangement be reversed, so that the denser liquid is external to the bladder, and the rarer liquid in the tube, the liquid in the tube passes through the bladder, and gradually sinks to a lower level. These phenomena were called by Dutrochet "endosmose" and "exosmose."

359. Matters in solution pass into the capillaries, and thence into the venous blood, by this process of "endosmose," which goes on the more rapidly as the denser fluid (the blood) contained within the vessels is no sooner diluted than it gives place to a fresh portion, and thus endosmose takes place more completely, and goes on more constantly, than in fluids at rest.

360. This process of absorption by the capillaries and veins is very rapid. In a part free from epidermis it is almost instantaneous; and minute portions of fluid, or of substances held in solution, may not only be absorbed, but may be distributed through the circulating system in from less than half a minute to two minutes. In this way the rapid action of the more energetic poisons is explained; and it is only in rare instances, if in any, that a different explanation is needed.

361. The rapidity with which absorption takes place is well illustrated by the rapid passage of certain salts from the stomach to the kidney. In one experiment made by Westrumb, prussiate of potash was detected in the urine two minutes after it was swallowed; and in the history appended to a cast of the Epispadian Arburg, in the museum of King's College, it is stated that fluids may be seen trickling from the ureters into the bladder in from two to three minutes after they have been swallowed.

362. Several agents affect the rapidity with which imbibition and absorption take place. Of these galvanism is the chief. Thus Foderé has shown, that when sulphate of iron is introduced into the peritonæum, and prussiate of potash into the pleura, five or six minutes usually elapse before the two substances combine, but that their combination is instantaneous when a slight galvanic current is passed through the diaphragm. Absorption is also promoted by friction. Again, distension of the vessels retards absorption; depletion, on the other hand, accelerates it. Hence the use of venæsection in dropsy. Absorption also takes place slowly in parts covered by dense membranes. The absorbing power of the skin, for instance, is much increased by removing the cuticle. Absorption takes place readily from the subcutaneous cellular tissue.

363. All these means of promoting absorption are used in the practice of medicine—*galvanism*, especially in the case of fluids effused into joints; *depletion* in dropsies of the skin and serous cavities; *abrasion* by blisters, followed by narcotic applications, in severe neuralgia; *friction* of the surface, in order to introduce medicines and nutriment into the system in cases of extreme emaciation, and *subcutaneous injection* of narcotic substances to relieve pain.

364. The absorption of fluids of less density than the blood is easily accounted for by eudomose, which probably takes place chiefly through the coats of the capillaries or veins, and it is by this means, as just stated, that poisons find their way into the system. But the absorbent vessels also take up and restore to the circulation the serum which has exsuded through the parietes of the capillaries, being the liquor sanguinis, minus the fibrine and corpuscles, that have been used to build up the solid textures of the body. By the absorbents, too, it is most probable that interstitial absorption (absorption of the structure of the body itself) is brought about.

365. Of disordered function of the absorbent vessels little is known. Formerly all dropsical effusions were attributed to some fault of the absorbents, and remedies were given to promote absorption by stimulating those vessels into activity. There can be no doubt that the functions of the absorbents, like those of other vessels, vary in activity at different times and under different circumstances; but as the veins have been proved to possess the power of absorption as well as the lymphatics, it is difficult to assign to each class of vessels its proper sphere of activity, whether in health or disease. It has been shown, for instance, by direct experiment, that the veins absorb poisons; but it is no less clearly demonstrated by disease, that some poisons excite inflammation in the entire course of the absorbent vessels, and in the glands through which they pass; and this is attributed, and probably with justice, to the absorption of the poison by these vessels.

366. But whatever the share taken in the process of absorption by the veins and absorbents respectively, there is no doubt that the influence of the absorbents in the production of dropsies has been much exaggerated. These effusions arise in various states of system, and from various causes. Mechanical obstruction, venous congestion, inflammation, or debility, may give rise to an effusion of serum too abundant to be removed by the unaided, though still healthy, action of the absorbent vessels. If the obstruction be overcome, or the venous congestion removed, or the inflammation subdued, or the strength restored, the effusion ceases, and time alone is required to enable the absorbent vessels, whether veins or lymphatics, to take up the fluid which has been poured out.

367. The doctrine that dropsies are generally due to a defective action of the absorbents is in opposition to the notorious facts that patients suffering from dropsy are very readily affected by preparations of mercury, which must be absorbed before they can act, and that the

adipose tissue in such patients is often very rapidly removed, so as to occasion great emaciation.

368. The known efficacy of venous distension in preventing absorption, and of depletion in promoting it, point at once to the most efficacious means of removing dropsical effusions, viz., bloodletting, and the increase of the several secretions. If there is sufficient strength of constitution, these means suffice for their removal; if not, tonics or stimulants must be combined with the antiphlogistic measures.

369. The absorption of solid diseased structures has also been attributed to the increased action of the lymphatics, but perhaps without sufficient reason. Pressure, friction, and electricity, as well as mercury and iodine, are as likely to affect the capillaries which are the cause of the morbid growth, as the lymphatics or veins which are instrumental in removing it—moderate pressure, by giving support to the capillaries; stronger pressure, by still further diminishing their size; friction and electricity, by stimulating the coats of the small arteries, and restoring their contractility; and iodine and mercury, by a local action on those vessels, whether through the skin, or more circuitously through the circulation. The cessation or gradual removal of such tumours by these agents may be much more satisfactorily explained in this way than by an action upon the absorbents.

370. In the case both of dropsies and tumours, the result would be the same, whether the capillaries, ceasing to secrete fresh fluids or solids, the absorbents, without any increase of activity, remove by degrees that which has been effused; or the capillaries, continuing to secrete, the absorbents are excited to a corresponding increase of activity. The only difference is this, that according to the former supposition, the cause is permanently removed; according to the latter, the effect is merely counteracted. The first supposition seems the more feasible.

371. The physiology and general pathology of the circulating system would be incomplete if reference were not made to the peculiarities that mark the circulation through the *liver* and through the *brain*.

372. The function of the liver, and the nature of its secretion, have already been considered at some length in § 183 *et seq.*, and § 266. The peculiarities of its circulation have yet to be described. The liver differs from the kidneys in being supplied for the purpose of secretion with venous instead of arterial blood. It is true that the solid constituents of the urine are also secreted from blood which has previously been submitted to the action of the Malpighian tufts; so that a circulation analogous to that of the portal system of the liver exists within the kidney itself. But in the liver and lungs the secretions are immediately derived from the venous blood. The vena portæ is formed by the union of the veins of the stomach and intestines, of the spleen, pancreas, and gall-bladder, of the mesentery and omentum. With a slight and unimportant exception, it gathers the venous blood of the

entire intestinal canal and of all the organs engaged in the work of digestion, conveys it to the liver, where the bile is secreted from it, and is poured into the duodenum to aid in the digestion of the food, and to subserve the function of respiration. The position of the liver, intermediate between the whole apparatus of digestion, on the one hand, and the right side of the heart and lungs on the other, explains its liability to congestion from fulness of the portal system no less than from impeded circulation through the lungs.

373. The *brain* differs in some important respects from every other viscus. The viscera of the abdomen are contained in a yielding cavity with muscular parietes; those of the chest in a cavity consisting partly of bone and partly of muscle, but allowing of a considerable increase and decrease of size in all directions; but the brain is shut up in an unyielding cavity of bone. All these cavities are air-tight, but that of the cranium alone is both air-tight and unyielding, at least in the adult. It follows, then, that while all the cavities of the body must always be full, the cranium alone must always contain the same amount of matter, for the atmospheric pressure of 15 lbs. on every square inch of the surface of the body keeps the brain full, as it does a syphon. Now the brain consists of a mass of nervous matter, supplied with blood by a large number of vessels, and there is no reason to believe that this matter can suffer compression any more than so much water; at least, the strongest pressure which can be exerted upon it in the living body would probably not be rendered perceptible by the most delicate instrument. It is also an undoubted fact that, so long as the arteries and veins contain their due proportion of blood, the brain is not affected either by an increase or diminution of the pressure which it ordinarily sustains. A man who descends in a diving-bell thirty-four feet below the surface of the water, sustains an additional pressure of 15 lbs. on every square inch of his body, and yet his brain does not suffer. On the other hand, a man ascending a lofty mountain, or going up in a balloon, has the pressure on his body, and consequently on the vessels of his brain, materially diminished, and yet his brain is not affected. Thus the inhabitants of some of the valleys among the Andes, who live as far above the sea as the summit of Mont Blanc, suffer only half the pressure which the body has to bear at the level of the sea, and yet they enjoy health both of mind and body. Again, the head of the infant suffers severe pressure during birth, and the yielding cranium of the child allows of large accumulations of fluid, and yet the brain suffers nothing during birth, and often very little in hydrocephalus.

374. Mere pressure, then, does not affect the functions of the brain, and yet men are said to die of pressure on the brain. When blood, or serum, or lymph are found on the surface or in the ventricles, or a tumour in the substance of the brain, or a larger quantity of blood than usual in some of its vessels, death is said to have been occasioned by pressure. This statement is incorrect; pressure there is none. How, then, is the fatal result to be accounted for? Simply thus: the

brain, like all other organs of the body, is dependent for the due performance of its functions on its supply of blood, and a tumour or fluid within the cranium, by occupying space there, deprives the brain of a quantity of blood equal to its own bulk; and the functions of the brain suffer in proportion to the loss which it sustains. The functions of the brain most open to observation are voluntary motion and sensation, both of which are lost or greatly impaired. The less obvious functions—that is to say, the supply of nervous power to the more important viscera, especially those of circulation and respiration—are equally impaired: hence the infrequent pulse and respiration.

375. When blood is poured out suddenly, as in the common form of apoplexy, the symptoms are often more strongly marked, though the quantity of blood effused is very small, than in cases of slow effusion, or of the slow growth of tumours within the cranium. In these cases the brain adapts itself by degrees to the new circumstances in which it is placed. In most cases of apoplexy, indeed, the quantity of blood actually effused is too small to account for the serious disturbance of the functions of the brain, without taking into account, at the same time, the injury which the texture of the brain itself has suffered in the seat of the effusion, as well as the disturbance in the balance of the circulation which must have preceded and accompanied the rupture of the vessels. That such a disturbance is in itself sufficient to account for the symptoms is evident, from reported instances in which all the symptoms of apoplexy have been present without a single morbid appearance after death, except a disproportionate quantity of blood in the veins and sinuses.

376. Though the bony parietes of the skull may, as already stated, be looked upon as unyielding, and the brain as incompressible, it is obvious that some slight change of position may take place at the openings by which the blood-vessels and nerves pass in and out of the skull, and that the intimate connection existing between the vessels within the brain and those of the scalp and face may become a source of relief and safety in sudden determination of blood to the head. The flushed and turgid face which accompanies apoplectic seizures, and the engorgement or rupture of the vessels of the scalp, in cases of death by hanging or strangulation, are familiar consequences of this vascular connection.

377. There are cases of apoplexy, then (that is to say, cases in which the functions of the brain are greatly impeded), of which no other cause can be assigned but a want of balance in the circulation through the brain. The cerebral arteries contain scarcely any blood, while the veins are full of it; and it must be obvious that the brain thus imperfectly supplied is in as bad a condition as if it received no blood at all, or its vessels were filled with warm water.

378. When the venous blood is less decidedly in excess, the functions of the brain, of course, suffer less; and these slighter disturbances in the balance of the two circulations probably account for the various

condition of the mind in our waking and sleeping hours. On the other hand, if the circulation through the arteries be increased, instead of torpor of the functions of the brain we have the symptoms of excitement — heightened sensibility, strong muscular contractions, violent delirium, raving madness.

379. The balance in the circulation may be disturbed in various ways. Blood may be accumulated in the veins by pressure on the jugular veins or on the carotid arteries. As the change of arterial into venous blood is constantly going on, an arrest of the circulation in either direction will have the effect of increasing the quantity of venous blood in the brain, and this will be followed by sleep, more or less profound, by coma or apoplexy. External pressure, then, is one disturbing cause. An arrest of the heart's action, by putting a stop at once to the circulation through the brain, produces syncope, which differs from apoplexy merely in degree, the one arresting every function of the body, the other merely oppressing them more or less. A very feeble action of the heart will be attended with the same result; for the arteries of the brain receiving little blood, and the change from arterial to venous blood still going on, the brain must contain but a small quantity of arterial blood, and must consequently perform its functions imperfectly. Hence, the deep sleep or coma which often attends extreme debility, and hence the turgid condition of the veins of the head when death follows upon hæmorrhage or other debilitating cause. In these cases, however, an effusion of serum generally accompanies the turgescence of the veins.

380. The incautious use of the lancet in cases of inflammation of the brain often produces this very derangement of the circulation. The bold practitioner, not content with reducing the circulation through the arteries and veins to a state of equilibrium, carries depletion to the extent of greatly diminishing the quantity of the circulating fluid, and enfeebling the action of the heart. The arteries consequently receive little blood, the veins contain an undue proportion, the circulation through the brain becomes languid, the capillaries pour forth serum into the ventricles or on the surface, and the patient dies comatose.

381. All the organs of the body require, for the due performance of their functions, that the blood should traverse them with a certain degree of rapidity: a sluggish circulation, therefore, is attended with sluggish functions. This observation, of course, applies to the brain in common with all other parts of the frame; the effect, therefore, of a sluggish circulation through that organ will be a torpor in the functions which it performs—this torpor constitutes, according to its degree, drowsiness, sleep, or coma.

382. *Sleep* comes on, for the most part, at that period of the day, and in that posture, in which the circulation is most sluggish, viz., at night, and lying down. As a general rule, the pulse falls towards evening, and it is also less frequent in the horizontal than in the erect position of the body. These two circumstances, then, which favour a

slow circulation of the blood, also favour sleep, and partly explain its occurrence. But other causes must be taken into account, such as the darkness and silence, the absence of the usual impressions on the senses, and the exhaustion of the nervous system. This exhaustion reacts upon the circulation, and the circulation, in its turn, reacts upon the brain. Sleep, then, may be considered as due partly to exhaustion of the nervous system itself, partly to the absence of impressions on the organs of sense, and partly to the languid circulation through the brain. The negation or absence of any of these conditions produces wakefulness. Intense cold, which is another familiar cause of sleep, probably acts, partly by causing an accumulation of blood in the interior organs of the body, and partly as a direct sedative. A languid circulation through the brain will result in either case. In the cold stage of ague, the same state of circulation exists, and the same condition of brain. When this is of long continuance or of great severity, deep sleep or coma occurs..

383. Among other causes of this state may be mentioned repletion, and a certain stage of intoxication. The sleep which follows full meals may perhaps be explained by the circulation through the brain of the products of digestion not yet fully converted into blood; spirituous liquors act as a poison—stimulant in a small dose, and narcotic in a larger one.

384. The circulation through the brain varies much with the posture of the body. In the erect posture, the heart, in sending blood to the brain, has to oppose the force of gravity; but in the horizontal posture the heart has but little resistance to overcome. Hence, when the heart is feeble and the system drained of blood, a sudden change from the recumbent to the sitting or erect posture will sometimes cause fatal syncope; and, on the other hand, a patient who has fainted in the erect posture is soon restored by being laid on the back. When the head is lower than the rest of the body, the return of the venous blood to the heart is opposed by gravity; the balance of the circulation is therefore destroyed, and coma is threatened. This unfavourable position, combined with sudden exertion, as in stooping to tie a shoestring or pull on a boot, is an occasional cause of apoplexy.

385. The fact that the flow of blood to the head is favoured by the recumbent, and retarded by the erect posture, suggests the treatment to be adopted in cases of disease of the brain. Where there is high arterial action, the head should be raised; where there is much debility, the body should be placed horizontally. Such changes of posture are often attended with the best effects: thus instances are recorded in which pain, intolerable in the horizontal posture, has been at once removed by assuming the erect position.

386. When, again, it is desirable to produce a sudden and strong effect on the system by the abstraction of blood, the patient should be placed in the erect posture, for the heart soon loses the power of sending the blood upwards to the brain, and fainting follows as a conse-

quence. The same position should be adopted when it is our object to obtain the greatest effect with the least expenditure of blood.

387. Cerebral excitement is directly opposed to the states of sleep and coma, and arises from an opposite state of the circulation through the brain. The degree of violence displayed bears a pretty exact relation to the rapidity and force with which the arterial blood is circulated, and to the strength of the patient. In the strong and robust, the outward manifestations of the disturbance which the brain is suffering are violent, and the muscles contract with great force; but if the strength is much exhausted, the loud talking of furious delirium is exchanged for low muttering; the violent muscular efforts for subsultus tendinum; and the distinct impressions on the senses for *muscæ volitantes*, and *tinnitus aurium*.

3. STRUCTURAL PHYSIOLOGY AND PATHOLOGY.

388. In the two previous chapters the human body has been examined, first, as a chemical laboratory, in which the functions of digestion, assimilation, and sanguification are carried on; and, secondly, as a hydraulic system, by which the blood is distributed. It is next to be considered as an assemblage of minute structures, by which all the parts and organs are to be built up.

389. It has been already stated that the circulating system, consisting of arteries, capillaries, and veins, forms a continuous and unbroken, though most minutely-divided, reservoir of blood in motion. The arteries serve as carriers of pure blood *to* the several tissues, the veins as carriers of impure blood *from* them, while the capillaries, the immediate agents of growth and nutrition, connect the two classes of vessels.

390. As the capillaries have no open mouths, the tissues can be nourished only by transudation through their walls. The fluid employed in this work of nutrition is the *liquor sanguinis*; in other words, the blood itself less its red particles. As the liquor sanguinis contains albumen and fibrine, and all other elementary substances necessary to nutrition, it is obviously equal to the use thus assigned to it. Many of the capillaries transmit only this colourless liquid.

391. The liquor sanguinis exsuding through the coats of the capillaries, and brought into contact with the tissues, subserves the purposes of nutrition and growth, by being converted into the cells of Schleiden and Schwann, or "the germinal matter" and "formed material" of Dr. Beale.

Fig. 5.



392. According to the first-named authorities, all the tissues of the body are made up of cells, which consist originally of three distinct parts:—*c*, the cell-membrane; *b*, the nucleus, or *cytoblast*; and *a*, the nucleolus. The cells are developed in a fluid termed the *cytoblastema*, or cell-producer. In the case of the healthy tissues and of the new textures generated by healthy inflammation, this fluid is the

liquor sanguinis. The cell, once formed, grows by its own inherent powers; and as it contains, and is surrounded by, a fluid similar to that of which it was formed, similar cells, with the same constituent parts, form sometimes within it, and sometimes external to it.

393. The cells (Fig. 5), which have a rounded form when floating free in the cytoblastema, may increase in number so as to press against each other; in which case they assume, with more or less regularity, the hexagonal form that vesicles so circumstanced always put on. If the intervals between the cells are supposed to be occupied by a firm unorganized deposit, we have the essential elements of the harder tissues, such as cartilage or bone. If the cells, instead of being round or oval, are supposed to assume elongated forms, we have the elements of the fibrous tissues; and, lastly, if cells arranged in lines with their ends in apposition are supposed to have their opposed walls removed by absorption, we have the several hollow tubes, such as arteries, veins, absorbents, the sheaths of the nervous matter, &c.

394. Cells are not confined to the solid structures of the frame, but they also form a large portion of some of the fluids both in health and disease. Thus the red particles which float in the liquor sanguinis of the blood are nucleated cells; so also are the lymph globules.

395. The secretions of mucus and pus thrown out from inflamed surfaces, contain, in like manner, their peculiar mucus and pus-globules. In healthy pus formed on the surface of a wound, these pus-globules become organized, and constitute the successive layers of granulations. The superficial granulations present cells which resemble the pus-granules; in the deeper strata the nuclei are very distinct, and the envelopes polygonal from mutual pressure; while in the still deeper layers the envelopes of the cells are seen passing through all the gradual transitions of the fibres of areolar tissue.—(Henle.)

Fig. 6.



396. The cell-theory also admits of application to malignant growths. The liquor sanguinis, or cytoblastema, which exsudes through the capillaries, instead of furnishing the materials for healthy cells destined to build up healthy tissues, supplies the elements of cells of the irregular form of those depicted in the annexed engraving, and which form a constituent part of cancer.

For this cell-theory of Schleiden and Schwann, Dr. Beale has substituted a simpler account of the minute constituent parts of living beings. For the centre portion of the cell, he substitutes a spherical particle of germinal or active matter which itself consists of spherical particles of extreme minuteness, and an outer sphere of formed or inactive materials. The germinal matter may surround itself with successive layers of formed material. If there happen to be two such layers distinguishable by the microscope, the outer will correspond to the cell-membrane, and the inner to the nucleus, while the central germinal matter is itself the nucleolus. It is

his central germinal matter which alone possesses active formative properties, and it is this which appropriates and assimilates the liquor sanguinis with which the tissues are bathed.

397. The cell-theory, or the modified theory of Dr. Beale, applies to diseased as well as to healthy growths; but many structural changes are dependent upon widely-different causes.

398. One class of structural changes, for instance, consists in a simple mechanical enlargement of hollow organs, such as the stomach, large and small intestines, and urinary bladder, from habitual distension; of the veins of the extremities from pressure on the large venous trunks; and of the anastomosing branches of arteries as a consequence of the application of a ligature to the main trunk.

399. A second class of structural changes consists in *abnormal nutrition*, without any change in the minute texture of the parts affected: This abnormal nutrition may be excessive or defective. The former is called *hypertrophy*; the latter, *atrophy*.

400. The principal cause of *hypertrophy* is increased action: this is shown in the muscles of the athlete; in the heart and bladder when they encounter some obstacle to the evacuation of their contents; in the uterus during pregnancy; in the mammæ of the female when secreting milk; in the mucous membrane of the bladder exposed to irritation from stone or gravel.

401. *Atrophy* arises from opposite causes; from disuse of parts, as of the muscles in the sedentary, in the paralytic, and in the bedridden; from obstruction to the flow of blood by ligatures; or from the operation of certain powerful medicines, such as iodine and the salts of lead. Internal organs may also become atrophied from a cause described in 308. Atrophy is accordingly accompanied by paleness of the parts affected: hypertrophy by increase of colour.

402. Hypertrophy and atrophy are sometimes limited to one constituent part of a texture. Thus bone may assume an unusual hardness, from the crowding of several earthy particles into the space commonly occupied by a few. On the other hand, the bones are subject to softening, from an absence of the earthy matter.

403. A third class of structural changes consists of the effects of common inflammation (§ 313), due to common causes.

404. A fourth class comprises the effects of inflammation due to specific causes; such as the inflammation and suppuration of the lymphatic glands in syphilis, plague, and glanders, and from wounds received in dissection; the inflammatory affections of the skin which characterise the febrile exanthemata; and the local deposits or formations of pus in the lungs, liver, serous cavities, and joints which supervene upon phlebitis.

405. But in addition to these familiar structural changes, there is a large class of morbid growths which have been grouped in two leading classes, under the designations *analogous* and *heterologous*.

406. It has been already stated that the liquor sanguinis, acting as the cytoblastema or cell-producer, forms the matrix in which a variety of adventitious growths are deposited, such as the cellular, the serous, the fibrous, the cartilaginous, or the osseous. These adventitious growths are usually determined by the nature of the texture in or upon which they are formed; thus they resemble serous membrane in the cavity of the pleura or peritonæum, they are often cartilaginous in joints, and bear a close resemblance to muscle in the uterus. Such formations are called *analogous*, because they are similar to those naturally forming part of the body. When such formations have no resemblance to natural structure, they are termed *heterologous*.

407. The class of *analogous* formations is a very large and a very important one, and comprises some of the most fatal diseases of the secreting organs, especially of the liver and kidney, as well as several morbid states of the heart and arteries.

408. Deposits of fat or oil-globules play an important part in the production of disease in some of the most important organs of the economy. They constitute the disease known as fatty degeneration of the liver, and certain forms of Bright's disease of the kidney. The fat is deposited in the epithelial cells of the secreting surfaces, and in the cellular tissue connecting the vessels. In disease of the kidney the secreting tubes lined with cells containing oil-globules are expelled

with the urine, so as to furnish evidence during life of the character of the disease of which the kidney is the seat. The annexed illustrations show the mode in which the oil-globules are deposited in the cells of these organs. In Fig. 7, *a* represents healthy cells of the liver, free from fat-globules; and *b*, cells from a liver in a state of fatty degeneration. In Fig. 8, *a* represents healthy epithelial cells of the kidney, and *b*, cells loaded with fat-globules.

Fig. 7.



Fig. 8.



409. The first effect of these abnormal deposits of fat is to increase the size of the diseased organs without materially affecting their functions; but in more advanced stages of the disease the fatty deposits, by encroaching more and more on the vessels and secreting apparatus, impair the secreting power of the cells on the one hand, and restrict the supply of blood on the other. Hence, in extreme cases of fatty degeneration, the organs affected are reduced to a state of *anæmia*, and become quite unequal to the performance of their functions; and instead of increasing in size, they actually shrink from the cessation of nutrition

and the absorption of the fat-globules, the deposition of which was the original cause of the disease.

410. But the agency of deposits of fat in producing organic disease is not limited to the secreting organs. It extends also to the several tissues of the body. These deposits are laid down, for instance, in the muscular structure of the heart, constituting fatty degeneration of that organ, and enfeebling it by encroaching on the space which in health is occupied by muscular tissue.

411. Fatty deposits associated with earthy matter are also of frequent occurrence in the coats of arteries, which are often found to be the seat of this species of degeneration in subjects affected by similar disease of the liver and kidneys. They are known as *atheromatous* degenerations.

412. These deposits in the arteries are situate either in the cellular membrane between the inner and middle coats, or in the fibres of the middle coat itself. When they occur in the middle coat of the larger arteries, they take the place of the healthy structure, impair its elasticity, and lead to dilatation of the vessel. In the smaller vessels they are often carried to such an extent as to obliterate the cavities, and thus to cut off the supply of blood from the parts to which they are distributed. Thus, when the coronary artery of the heart is the seat of atheromatous formations, the muscular substance of the heart itself becomes atrophied. This class of deposits is found to obey the law of symmetry, attacking equally and similarly the vessels on both sides of the body.

413. The atheromatous deposits in the coats of the arteries often become the seat of ulceration, leading to perforation of the vessels and sudden death from hæmorrhage. When the ulcers make their way through the inner coat of the arteries, they project as ragged uneven tumours from the inner coat, and when they occur in the aorta, are frequent causes of abnormal blowing and sawing sounds.

414. In another very numerous class of cases the atheromatous spot becomes the nidus of calcareous deposit, and the vessel is said to degenerate into bone.

415. The small arteries, veins, and capillaries of the brain also are subject to fatty degeneration. Oil-globules are deposited in the transverse fibrous coat of the arteries, and in the corresponding coat of the veins. They may be seen under the microscope, either as "minute, shining, black-edged particles, like molecules of oil, thinly and irregularly scattered beneath the outer surface of the small blood-vessels," or as globules of larger size, more closely packed together, or in round or oval clusters, "like large granule-cells." The subjoined engraving, from a paper by Mr. Paget, in the

Fig. 9.



“London Medical Gazette,” 1850, shows the appearance of a small artery under this form of degeneration.

416. In consequence of this deposit of oil-globules, the even outline of the vessels is lost, and their proper structures gradually waste and disappear, so that the smaller vessels dilate into minute aneurismal pouches. The proper vascular structure being thus weakened, softening of the brain ensues, followed by rupture of the vessels. This is one form of apoplexy.

417. Another analogous formation consists in a deposit of semi-cartilaginous matter on the free surface of the lining membrane of the arteries. The most common seats of this morbid secretion are the valves of the heart and aorta, the larger vessels at the points where they give off branches, and the smaller arteries throughout their whole extent. Calcareous deposits, having the hardness of bone, are also of frequent occurrence in the heart and arteries as independent formations; that is to say, they take place where the structures have not previously undergone some other form of degeneration. The fibrinous deposits which attach themselves as *vegetations* to the lining membrane of the heart, more especially to that covering the valves, afford another familiar example of an *analogous* formation.

418. The interesting researches of Dr. Kirkes have attached a new and unexpected interest to these deposits on the valves of the heart. It appears that they occasionally become detached from the mitral valve, and, being borne forward by the current of the circulation, are lodged in one of the arteries of the brain, impede or stop the circulation through it, cut off the supply of blood to a portion of the brain, which becomes softened, and gives rise to hemiplegia.

419. Another instance of fatty degeneration has been pointed out by Mr. Canton in the *arcus senilis*, or white line which is seen just within the circumference of the cornea in many aged persons, in some persons who have passed the middle of life, and occasionally as early as 35 years of age. In some instances it is associated with fatty degeneration of more important organs; but its value as a sign of such degeneration has certainly been exaggerated. Fatty degeneration of the ovum has also been shown to be a frequent cause of abortion.

420. It will be seen, then, that deposits of fat, or oil-globules, whether in the cellular membrane uniting the vessels of secreting organs and in the coats of arteries, or in the epithelial cells of secreting membranes; whether continuing in their original form, and encroaching gradually on the healthy structure of the organs which they attack, or becoming the seats of ulceration, or of calcareous deposits,—play a most important part in the history of organic disease.

421. These fatty deposits may sometimes be confidently traced to the imperfect oxygenation of the carbon contained in the venous blood. The fatty degeneration of the kidney, for instance, is a common occurrence both in men and animals living in dark, filthy, and ill-venti-

lated places, where the air is unfit to support the process of combustion in all its vigour, at the same time that the constitution is enfeebled. Again, the fatty degeneration of the liver and kidneys, the atheromatous deposits in the coats of the arteries, and the fatty degeneration of the heart, are often found in combination in the spirit-drinker, who is constantly introducing into his system a large supply of a liquid hydrocarbon, of which the gaseous elements attract the oxygen that ought to be devoted to the combustion of the carbonaceous matters derived from the food and from the effete textures of the frame.

422. *Heterologous formations*.—These morbid growths may be divided into two classes—*non-malignant* and *malignant*. The first comprises *tubercle*, the second the several forms of *cancer*. Tubercular diseases generally fall under the care of the physician; malignant diseases more commonly into the hands of the surgeon. But both classes may occupy either the external or internal organs of the body.

423. *Non-malignant Diseases. Tubercle*.—This is deposited on the surface of membranes, or in the texture of organs. It presents itself in two different forms—the one whitish grey, semi-transparent, and dense; the other yellow, opaque, and friable. The first may be changed into the second, but the second is never transformed into the first. The grey tubercle is found in small isolated portions, as in the air-cells of the lungs constituting miliary tubercles, or on the surface of serous membranes. The yellow variety is found in the same situations, as well as on the surface of mucous membranes, and in the substance of the several organs—in the follicles of the intestines, in lymphatic glands, in the liver, spleen, brain, uterus, &c. It assumes different forms according to its situation, sometimes being collected in a distinct mass, sometimes diffused through the tissues of an organ as a homogeneous cheesy matter; and it may be so thoroughly blended with the textures as to assume the very form of the organs attacked, which are then said to degenerate into it.

424. Tubercle may be resolved into albumen, fibrine, gelatin, salts of soda and lime, and water, with a small quantity of fatty matter. Under the microscope *miliary* tubercle presents a granular appearance, the granules being blended with nucleated cells, or *tubercle corpuscles*. The yellow variety also consists chiefly of granules, interspersed with minute spherules, irregular flakes, and numerous oil-globules, edged with a few perfect cells.

425. Tubercle is sometimes, though rarely, deposited before birth; it is not common before the fourth year; is frequent between the fourth and fifth; less frequent, again, from this time till puberty; most frequent of all between puberty and the age of fifty. The lungs are its most common seat, so that after the age of fifteen it is almost never met with in other organs without existing in them at the same time. The state of constitution (*tuberculous cachexy*) which leads to their deposition may be either inherited or acquired.

426. Tuberculous matter is deposited slowly, without causing pain

or inconvenience, and may remain in a quiescent state for a very considerable period. At length, in the course of a common cold, or slight febrile attack, the tubercle begins to act as a foreign body, and sets up inflammation in the surrounding tissues. When this change takes place in the substance of the absorbent glands, serum and pus are poured out, and an abscess is formed, which slowly approaches the surface, bursts, and discharges the tubercle softened and broken down by the effused fluids. The walls of the abscess then generally contract and heal. Tubercles in the lungs undergo the same change, the matter being expectorated; but sometimes the tubercle is converted into a chalky or earthy matter, which may remain quiescent for the remainder of life. When the seat of the deposit is the mucous membrane of the larynx or intestines, the membrane ulcerates.

427. Scrofulous subjects, besides being liable to tubercular deposits, are particularly subject to the chronic forms of inflammation, suppuration, and ulceration. The lymph effused, as the result of inflammatory action, is curdy, and wanting in consistence, the pus serous and flaky, and granulations, when formed, are large, pale, and flabby. Scrofulous children are very liable to pustular, scabby eruptions of the ears and mouth, which discharge a thin acrid matter. Scrofulous enlargement, inflammation, and suppuration of the absorbent glands, especially of the neck, and a similar affection of the mesenteric glands occasioning the disease known as *tabes mesenterica*, are also common in childhood.

428. It has been shown experimentally that tubercular deposits may be produced at will in animals by confining them in close dirty places, and feeding them on unwholesome food.

429. *Malignant Diseases*.—These heterologous formations resemble tubercles in affecting almost all the organs of the body, but they exhibit a preference for a particular class of structures; in being frequently traceable to hereditary predisposition; and in their tendency to excite destructive inflammation of the parts affected. On the other hand, malignant growths are distinguished by their tendency to extend into surrounding textures, and, when inflammation has been set up, to progressively destroy them; by following the course of the absorbents and attacking the lymphatic glands; and by reappearing, after removal, in or near the cicatrix, or in some internal organ nearly connected, through the absorbent system, with the part first attacked. The true malignant growths may be all comprised under the general name of *Carcinoma* or *Cancer*.

430. *Carcinoma (Cancer)*.—This term was originally applied to a malignant ulcer supposed to bear a resemblance to a crab (*καρκίνος*, cancer), but it now comprises many changes of structure differing widely in their physical characters. *Carcinoma* may be divided into two species, *Scirrhus* and *Cephaloma*. The varieties of *Scirrhus* are scirrhus pancreatic sarcoma, tissue lardaceous, matière colloïde, cancer gelatiniforme; those of *Cephaloma* are vascular sarcoma, and medullary sarcoma. All these consist of compound cysts varying in their solid

and fluid contents, growing from broad bases, or from narrow peduncles which, springing from a single spot, give to the tumour a radiated appearance: the smallest cysts are enveloped in a larger one. The various appearances presented by these tumours are partly due to the inflammation which takes place in them and in the surrounding textures, and partly to the entire or broken state of the cysts themselves.

431. *Melanosis*.—This is an unorganized product, of a dark brown, dull bistre, or sooty-black colour. It is deposited in masses with or without cysts, or in patches on the surface of membranes. Sometimes it is met with in small points, and occasionally it has been found liquid, in accidental cavities. Its most frequent seat is the liver; but it is occasionally found in the eye, the skin, the brain, the lungs, the kidneys, and other glandular organs. Its chemical constituents are albumen, fibrine, and the salts usually found in the blood, with a colouring matter abounding in carbon. It is often found associated with other malignant growths, but is distinguished from them by the cells continuing free instead of being attached to the surrounding tissue.

432. Deposits of a black colouring matter are often found in the bronchial glands and on the surface of the lungs both before and after birth. Such deposits are not of a malignant character. It is also probable that malignant melanotic growths consist of this dark deposit blended with a true malignant structure.

4. THE NERVOUS SYSTEM.

433. The vital principle, which endows every part of the frame, and even the blood itself, with properties distinct from those of unorganized matter, is more especially connected with the nervous system. The *brain*, as the organ of the mind, is the immediate source of volition, and the centre to which all sensations are ultimately referred; the *spinal cord* (a continuation of certain portions of the brain) is the immediate origin of the greater part of the nerves both of sensation and volition, and the brain and spinal cord together form the joint source from which all the nerves of sensation and voluntary motion arise, from which all the mandates of the will are sent forth, and to which the intelligence of the senses is conveyed.

434. There is also a separate centre of nervous influence in the *sympathetic*, which connecting itself, in a manner little understood, with the nerves of motion and sensation, presides over the functions of the organs most essential to life, and is the source of most of those movements which are independent of the will, of many of those sensations by which life is preserved, and of those chemical changes which are peculiar to organized beings. For the important movements of respiration, moreover, a peculiar set of nerves, springing from distinct columns of the medulla oblongata, is provided.

435. But there is another function, and a corresponding set of nerves, to which the attention of the profession has been strongly directed by

Marshall Hall and Professor Müller,—the reflex function and the excito-motory system. There are certain parts of the body (chiefly the canals lined by mucous membrane, and especially their outlets), which, when irritated, excite to contraction the muscles subservient to the performance of their functions. Thus, if the lining membrane of the air passages is irritated, the respiratory muscles are thrown into violent action. Here there is no exercise of volition, and yet there is muscular contraction. Observations made in cases of paralysis attended with loss of sensation and voluntary motion, and experiments on decapitated animals, have further shown, that for the production of these effects it is not necessary that sensation or volition should be present. Hence it became necessary to suppose the existence of a separate set of nerves: one going from the skin, or mucous membrane, to the brain or spinal marrow; and the other, from the brain or spinal marrow to the muscles. The absence of common sensation and volition at once pointed to the spinal marrow, and not the brain, as the centre of union of these two sets of fibres; and what theory had pointed out as necessary, the researches of modern anatomists have shown to be true.

436. Sensation, motion, excitation, and reflection do not, however, comprehend all the functions of the nervous system. If we consider the number and combinations of the movements of the body, we shall see the necessity for the exercise of some regulating power whereby the complex muscular movements shall be orderly performed in accordance with the intentions of the will. Such a regulative power has been recognized by modern physiologists, and has been termed the co-ordinating function.

437. The following scheme, therefore, represents the several orders of nerves, and the relations which they bear to the brain and spinal marrow.

(1.) The cerebral, or sentient and voluntary, of which the brain is the centre.

(2.) The cerebellar.

(3.) The true spinal, or excito-motory, of which the true spinal cord is the centre.

(4.) The ganglionic, or the nutrient, secretory, &c., of which the sympathetic forms the principal portion.

438. The first order of nerves comprises all the nerves of *sensation* (the olfactory, the optic, the auditory, the gustatory, and the nerves of touch), and all the nerves of voluntary motion, with their common centre in the cerebrum. The greater part of the nerves of touch, or common sensation, and the greater part of the nerves of voluntary motion, form the external portions of the spinal marrow, and in this manner communicate with the brain.

439. Many theories have been advanced with regard to the function of the cerebellum. Pathology and experiment combine to prove that it is the centre of a co-ordinating function voluntarily exercised over the

motor nerves. The posterior columns of the spinal cord, which are downward prolongations of the cerebellum, are believed to have the same function, for they are destitute of sensation; and section of them does not weaken or destroy motion, but injury of either the cerebellum or posterior columns of the cord results in proportionate disorder of the muscular movements.

440. The third set consists also of two orders of nerves, of which the one passes chiefly from the internal mucous surfaces to the interior parts of the medulla oblongata and the cord, and the other from those parts of the spinal cord to muscles having peculiar actions subservient chiefly to ingestion and egestion. Some fibres of the same order of nerves are probably distributed to other parts of the body, such as the skin and the muscles of voluntary motion.

441. That part of the spinal marrow to and from which these nerves run, has been called the *true* spinal marrow, in contradistinction to those parts of it which are formed of longitudinal (commissural) fibres going to the brain. The motious due to this system are termed *excited*.

442. The third class of nerves, or the ganglionic, consist of the *internal* ganglionic, or sympathetic, including a few fibres of the pneumogastric; and the *external* ganglionic, embracing the fifth nerve and the posterior roots of the spinal nerves. These latter are supposed to be chiefly destined for the nutrition of the external organs.

443. The functions corresponding to the four divisions of the nervous system, then, are:—1, sensation and voluntary motion; 2, co-ordination of muscular movements; 3, excitements to action without sensation, and combined motions without volition; and 4, nutrition, secretion, and the motions connected with them.

444. The nerves consist of bundles of minute fibres, enclosed in sheaths, distinct through their entire course. Each fibre is connected at its origin with a nerve vesicle; in its passage to the periphery it maintains a simple condition, but having arrived at the part to which it is to be distributed, it begins to branch freely, and, uniting with the branches of other nerves, forms at last a network of excessive tenuity.

445. Experiment has made us acquainted with the functions of the more important nerves, but has left much yet to be discovered. It has also thrown light on the laws which govern the transmission of nervous influence, though it has left the nature of that influence involved in the same obscurity which hangs over the real essence of light, heat, or electricity, with which last force, however, experiment shows that it has many points in common.

446. The effect of the division of a nerve is well known. If the nerve be one of sensation, irritation of the branches or trunk of the nerve below the point of division causes no pain; if it be a nerve of voluntary motion, neither the will nor a stimulus applied to the nerve above the point of division can cause the muscle to which it is distributed to contract. On the other hand, if the voluntary nerve be irritated below the point

of division, or the sentient nerve above it, motion takes place in the one case, and sensation in the other ; the sensation being referred to the parts to which the nerve is distributed.

447. This law of sensation is strikingly illustrated in cases of amputation of an arm or a leg, where irritation of the divided extremity of the nerve is referred to the fingers or toes of the lost limb, even for years after its removal.

448. The fact that irritation of the trunk of a sentient nerve produces pain, not in the trunk itself, but in the parts to which its branches are distributed, admits of practical application, and tends to destroy our confidence in the division of nerves as a remedy for pains in the parts which they supply. The failure of this remedy in several cases of *tic-doloureux* has been satisfactorily explained by the discovery of some permanent cause of irritation, such as a tumour or spicula of bone, at the origin of the nerve.

449. Although pressure applied to a sentient nerve causes pain in the parts supplied by its branches, a still stronger pressure produces pain in the trunk of the nerve itself. Severe injury to a nerve of sensation or voluntary motion destroys its power as a conductor of nervous influence, but it affects the nerve itself only locally ; for irritation of that portion of the uninjured sensitive nerve which is in connexion with the brain produces sensation, and irritation of that portion of the nerve of volition in connexion with the muscles causes muscular contraction. When, however, a nerve of motion is stretched violently through its whole length, it loses its property of conducting the stimulus of muscular contraction, and sometimes the muscle itself loses its irritability, and cannot be made to contract by the most powerful stimulus.

450. Experiments on animals have brought to light some properties of the nerves, which may be advantageously borne in mind by the pathologist. It has been proved that all stimulants applied to the nerves in the dead body, act in nearly the same way, the effect differing merely in degree ; but the electric and galvanic fluids being the most effectual, have been generally selected for experiment. It has also been shown that the nerves, when stimulated by galvanism, do not act as mere conductors of the galvanic fluid, for the muscles contract when the current is made to pass transversely through the motor nerve. Again, it has been proved that the muscles cannot be made to contract by any degree of mechanical irritation applied to a nerve of sensation, while the slightest irritation of a nerve of motion gives rise to very strong contractions. Hence it appears that the nerves themselves possess a property of exciting muscular contractions on the application of stimuli, independent of the brain and spinal cord. It has been further shown that this property may be exhausted by the continued application of a stimulus, to return after an interval of rest.

451. These experiments on dead animals are in accordance with the results of observation in the living human body. The exhausted ner-

rous power must be restored by rest; the exhaustion of the entire frame is repaired by sleep; and stimuli, whether mechanical, chemical, or electrical, cause the nerves to which they are applied to manifest the characteristic properties with which they are endowed. Thus irritation of a nerve of common sensation causes pain; of a nerve of motion, muscular contraction: and the stimulus of galvanism excites in each organ of sense the sensation proper to it—taste in the tongue, a peculiar odour in the nose, light in the eye, a musical sound in the ear. Lastly, irritation of the origin of the pneumo-gastric nerve gives rise to a derangement of the digestive process manifested by the elimination of sugar from the kidney.

452. Some stimulants, especially heat, cold, and electricity, admit of application in disease. Both heat and cold cause the muscles to contract, and when excessive destroy the irritability of the muscles. Cold water injected into an artery causes contraction in the muscles which it supplies; and this fact has been taken advantage of in cases of uterine hæmorrhage after delivery, by injecting cold water into the vessels of the still-adhering placenta. The efficacy of cold suddenly applied externally or internally, in causing contraction of the uterus, is well known. The good effects of electricity and galvanism in exciting muscular contractions is manifested in some cases of paralysis.

453. Stimuli of great power and intensity, though applied only momentarily, may utterly destroy the excitability of the nerves, as happens with the optic nerve when a flash of lightning produces permanent blindness; and with the brain and spinal cord when it causes sudden death. Permanent paralysis may arise from the same cause. A weaker stimulus applied for a longer time may produce the same effect. Thus snow blindness sometimes follows the continued strong reflection of light on the retina, and paralysis of the muscles violent and long-continued exercise. Still weaker stimuli, or the same stimuli applied for a shorter period, impair the excitability of the nerves and cause fatigue. Thus the eye fixed for a long time on the same colour becomes insensible to the impression of that colour; and if the same set of muscles is kept in action only for a few minutes, as when we hold the arm extended, or stand quite still, we feel extreme fatigue: but the slightest change of posture affords instantaneous relief.

454. Extreme exhaustion of the nervous power is always accompanied by severe pain. Thus, the long-continued application of the stimulus of light to the eye, or of the stimulus of cold or heat to the skin, gives rise to acute suffering; and the long-continued action of the muscles in walking, may occasion the most excruciating agony.

455. The application of a stimulus, then, to the nerves of sensation or voluntary motion, produces, according to its degree and duration, entire destruction or great exhaustion of the nervous power, accompanied in extreme cases by severe suffering; and the functions of the nerves are not restored till after rest proportioned to the exhaustion. The brain and spinal cord are the sources whence the restorative influence ema-

nates, and motor nerves, permanently cut off from those centres, lose their property of exciting the muscles to contraction.

456. Stimuli, then, first excite the nerves, and then exhaust their excitability; but there are substances known as *narcotics* which have the effect of directly deadening the excitability of the nerves, and, if applied in a concentrated form, of entirely destroying it. If, for instance, the ischiatic nerve of a frog be dissected, and allowed to hang in a solution of opium or morphia, the immersed portion of nerve is entirely deprived of its power of exciting muscular contraction, and the leg of a frog steeped in a solution of opium, or of hydrocyanic acid, is paralysed. The same effect is produced upon the heart by infusions of opium and tobacco, on the intestines by opium and ticunas, on the human iris by the local application of extract of belladonna, on the muscles of the hands by the handling of lead, on the lips and tongue by chewing monkshood, and on the fingers by the vapours of strong hydrocyanic acid.

457. Narcotic poisons introduced directly into the circulation, or indirectly through the stomach or other circuitous channel, also produce a local action on the nerves. Thus, Müller having divided all the vessels and muscles of the thigh of a frog, poisoned the animal with nuxvomica, and found that the irritability of the sound leg was lost much sooner than that of the leg of which the vessels and muscles had been divided. This loss of irritability in the sound leg could be attributed to no other cause than the circulation through it of blood containing the poison, and the consequent local effect of the poison on its nerves; and it is doubtless by such local effect on the parts of the nervous system most essential to life, or on the nerves supplying the heart or lungs, that narcotic poisons, after being absorbed and circulated with the blood, prove fatal.

458. It has also been proved that poisons act with greater force when circulating with the blood than when applied directly to the nervous trunks. Thus, strychnia applied in powder to the moist spinal cord of the frog, excites no twitchings of the muscles, while the most violent contractions are produced by very small quantities absorbed into the blood. Other experiments may be adduced to prove that poisons circulating with the blood produce their effect chiefly by acting on the spinal cord and brain. Thus, when an animal is poisoned with opium or strychnia, if the nerves of one of the limbs are divided, the spasms in that limb cease; and if the spinal marrow is cut through before an animal is poisoned with upas, the parts supplied by nerves from the lower portion of the cord are not convulsed. Narcotic poisons generated within the body itself also act fatally on the nervous centres through the circulation. Thus urea, when it accumulates in the blood in consequence of the loss of power in the kidneys to eliminate it, acts on the brain, and proves fatal by inducing coma.

459. The foregoing observations apply chiefly to the nerves of sensation and voluntary motion, which have the brain and certain portions of the spinal cord for their origin and centre. There yet remain to be

examined the functions of the sympathetic nerve and of the excitomotor system.

460. *The Sympathetic.*—The functions of this nerve are threefold: it presides over the involuntary muscular fibre; it is the medium by which all impressions are conveyed from the parts to which it is distributed to the central nervous system; and it regulates the processes of secretion and nutrition in every part of the frame.

461. With regard to the first property of the sympathetic—that of presiding over the involuntary motions of the more important viscera—it has been ascertained by experiment that the parts which this nerve supplies, as the heart and the intestinal canal, continue to move long after they are separated from their connexion with the rest of the sympathetic system, and even after their removal from the body, whether the motions are rhythmic, as in the heart, or continuous, as in the intestines: and that the contractility of these parts survives that of the voluntary muscles. The effects of stimuli applied to the sympathetic nerve are also of longer continuance than those of stimuli applied to the nerves of voluntary motion.

462. All the parts supplied by the sympathetic nerve are, to a certain extent, independent of the brain and spinal cord. Thus, the heart will continue to beat long after the division of its nerves, after severe injury of the brain and spinal cord, and even after its entire removal from the body. That the spinal cord, however, does influence the contractions of the heart has been proved experimentally; and that the brain affects them is shown by the familiar effect of mental emotions upon them. Certain excitations of the brain and spinal cord are doubtless conveyed to the sympathetic by means of the *rami intercommunicantes* existing between the two systems of nerves, and by the same channels impressions on the sympathetic nerve may in like manner be conveyed to the spinal cord and brain, and excite either sensation or movement in parts to which the cerebro-spinal nerves are distributed.

463. The impressions made on the nervous fibres of the sympathetic are not usually conveyed to the brain; in other words, they are not of the nature of sensations; but violent causes of irritation may give rise to sensation in parts supplied by nerves from the sympathetic as well as in those supplied by cerebro-spinal nerves. When the cerebro-spinal nerves are the seat of the irritation, the painful sensations are usually experienced in the extreme parts of the organs affected: thus, we have itching of the nose and anus from the irritation of worms in the intestines, and pain and itching in the glans penis from disease of the kidneys and bladder. But irritation in the intestines or a disordered condition of the uterine functions, is a familiar cause of reflected sensations of a still more marked character, such as the acute pains in the muscles of the chest and abdomen occurring in hysterical females, accompanied by tenderness of the spine itself, and sometimes removed by remedies applied to that part.

464. The same irritation conveyed to the spinal marrow, and accom-

panied by tenderness there, may also be reflected through the nerves of voluntary motion, and give rise to spasmodic diseases. Thus, intestinal irritation occasions convulsions, chorea, and tetanus, in infants and young children, and hysteria affecting the muscles of voluntary motion, but especially those of respiration, in adults. Vomiting and hiccup are also produced by irritation of the nerves of the intestines, kidneys, or uterus.

465. The sympathetic nerve has been shown to preside over secretion and nutrition, and consequently over the functions of the parts concerned in these important processes: the capillary vessels, therefore, and the arterial system generally, fall under its influence. This admits of experimental demonstration. Thus section of the sympathetic on one side of the neck causes permanent dilatation of the capillary blood-vessels of the corresponding side of the face, and on irritating the trunk of the nerve they again contract. But although the circulatory organs are thus placed directly under the influence of the sympathetic, the production of syneope and blushing from mental emotion prove that impressions on the sentient nerves may be reflected on parts supplied by the sympathetic. These reciprocal phenomena are due to the interchange of fibres between the two systems of nerves. The alteration in the size of the capillaries under the influences of emotion and inflammation has been already adverted to (§ 294, *et seq.*).

Such being the functions of the sympathetic, it follows that the circulation, both general and local, must be intimately dependent upon the condition of this nerve. It is probable that those general conditions of the circulation indicated by variations of the pulse, ranging between a sharp, hard, and excited beat on the one hand, and a full, weak, compressible one on the other, are due to variations in the degree of nervous force transmitted by the sympathetic to the muscular tissue of the heart and arteries. It is also probable that the primary local phenomenon of inflammation, the dilatation of the capillaries, is due to diminution of the nervous power of the sympathetic.

466. In the general, as in the local affection, may we not have first the application of a stimulus, accompanied by an increase of nervous influence and consequent contraction of vessels, and then, as the necessary consequence, diminished nervous influence, and relaxation of vessels? This contracted state of the vessels is not overcome by a reaction in the centre of the circulating system, but yields to that diminished contractility which follows as certainly upon increased action as blunted sensibility upon over-exertion of the organs of sense, and fatigue upon long-continued or violent action of the muscles. This contracted state of the vessels is the *spasm* which plays so prominent a part in Cullen's theory of fever.

467. The sympathetic nerve, as the name implies, is assumed to be the organ of many of those combined sensations, motions, and secretions which we call *sympathies*. Sympathy is the reflection of impressions from one part of the nervous system to another and different part of it.

It may be otherwise defined as reciprocal feeling or action between different nerves and therefore between different parts, produced by reflex nervous action. Thus, the nerves of the surface and the central organs of the nervous system react on each other; the affection of the central organs in fever causing the various conditions of the skin, and shocks applied to the skin, exciting the brain and spinal cord. Again, cold water poured on the head restores the brain exhausted by long-continued inflammation; and dashed in the face or thrown on the chest, removes an hysterical fit, excites the nervous centres in cases of narcotic poisoning, restores persons from syncope, and is among the most efficacious remedies in asphyxia. In all these cases the central organs are roused to activity by the shock applied to the surface.

468. Sensitive nerves sympathise with sensitive, motor with motor, and sensitive and motor with each other. The optic, the olfactory, the auditory, and the ciliary nerves of the two sides are affected at the same time and in the same way, and an affection of one side often leads to a similar affection of the other: thus, inflammation of one eye is often followed by inflammation of the other; deafness of one ear by deafness of the other; an alteration in the size of one pupil by a similar alteration in the size of the other. This sympathy between the nerves of sensation supplying double organs extends also to nerves of different kinds and functions: thus, a strong light on the eye produces tickling in the nose; tickling the feet throws the whole body into convulsions; certain sounds put the teeth on edge; a tumour on a nerve may produce pain or spasms in parts of the body in no way connected with it. To phenomena of this kind the term *radiation of sensations* has been applied. Sympathies of motor nerves with each other occur in all associated movements. Those of motor with sensitive nerves belong to the class of excited or reflected motions.

469. The sympathies of entire organs with each other are very important. They may be classed as follows:—1. Sympathies between organs having similar structure and function; as the different salivary glands, the heart and blood-vessels, the stomach and intestines, &c. Thus vomiting is a common symptom of the passage of a gallstone into the intestines, of a renal calculus into the bladder. The introduction of a catheter, and the pain of acute orchitis, often produce the same affection. 2. Sympathies between organs of different texture, but belonging to the same system: as the digestive, the urinary, the generative, the respiratory system, and the united respiratory and circulating system, viz., the lungs and heart. 3. Sympathies of the more important viscera with the central organs of the nervous system: as in the convulsive attacks resulting from teething, or irritation in any other part of the alimentary canal; the acute frontal pain produced by cold water in the stomach; the sick headache, caused by the presence of indigestible food in the same viscus; and, conversely, the affections of the stomach, resulting from irritation or concussion of the brain. Epileptic fits often have their source in irritation of the stomach, uterus, &c. 4. Sympathies between organs not connected in any of the foregoing ways: such

of the Nervous System; the third column is added from a subsequent table, showing the physiology of the true spinal system, with many transpositions and some additions, the excited actions being placed opposite to those divisions of the first two columns with which they have the most obvious connexion. The excited actions in the third column are not produced by irritation of the incident nerves of the first, but correspond more closely with the excited action of the reflex motor branches of the second column. Thus, the incident excitor branches of the nostrils, when irritated, give rise not merely to the facial respiratory movements, but also throw the muscles of respiration into violent action. So likewise irritation of the bronchial incident nerves excites not merely the muscular fibres of the bronchial tubes, but the muscles of expiration also to the act of conghing.

471. The following table presents the pathology of the true spinal system, in accordance with the views of Marshall Hall:—

PATHOLOGY OF THE TRUE SPINAL SYSTEM.

Diseases of the Incident Nerves.

I. Dental. Gastric. Intestinal.	{ Irritation in Infants.	{ 1. Crowing inspiration. 2. Strabismus, spasm of the fingers and toes, strangury, tenesmus, &c. 3. Convulsions. 4. Paralysis. 1. Hysteria. 2. Asthma. 3. Vomiting, hiccup, &c. 4. Epilepsy. 5. Puerperal convulsions, &c.
II. Gastric. Intestinal. Uterine.	{ Irritation in Adults.	{ 1. Traumatic tetanus. 2. Hydrophobia, &c.
III. Motion and common sensation.	{ Ditto.	{ 1. Traumatic tetanus. 2. Hydrophobia, &c.

Diseases of the Reflex or Motor Nerves.

- | | |
|--------------------------|----------------|
| I. SPASM. | II. PARALYSIS. |
| a. Spasmodic tic. | |
| b. Torticollis. | |
| c. Contracted limbs, &c. | |

Diseases of the Spinal Marrow itself.

- I. Inflammation and other diseases.
- II. Diseases of the vertebræ and membranes.
- III. Counter Pressure, &c., in diseases within the cranium.
- IV. Centric epilepsy, tetanus, &c.
- V. Convulsions from loss of blood, &c.

472. As we have seen, the condition of the nervous system and that of other functions of the body reciprocally affect each other; but this mutual dependence is so strikingly displayed in the case of the circulation and the nervous centres, as to merit further consideration.

473. The effect of the emotions and passions, and of all violent exertions of the body, on the heart, is a matter of daily observation; and so surely does the circulation participate in every change of the nervous system that it becomes the best test of the degree and amount of that

change. Every violent exertion of different muscles, and every long-continued exercise of the same muscles, strongly excites the pulse; and rest not only restores it to the frequency which it had before the effort, but for a time reduces it below it. The various causes of excitement to which the body is exposed during its waking hours affect the circulation in the same way. It is in consequence of the fatigue produced by these causes that the pulse falls towards evening, and regains its frequency when the body has been refreshed by sleep. Precisely the same effects are produced by disease. In febrile affections, for instance, the pulse during the height of the disorder is much more frequent than in health, but as soon as the disease has passed away, the pulse falls many beats below its natural frequency, to regain that frequency again as health and strength return.

474. Another remarkable fact established by careful observation of the pulse is, that the body is much more affected by all causes of excitement when it is in full possession of its strength, than when it is exhausted by fatigue. Thus all stimuli—muscular exertion, food, drink, and even mental application—produce a much greater and much more enduring effect on the circulation in the morning than at night.

475. But there are states of debility in which the heart's action is more frequent than in health. This occurs in a more advanced stage of convalescence, when the patient begins to recover his strength, and also in the decline of febrile affections, so long as any degree of fever continues. A greater degree of debility in the absence of actual disease is characterised by a very small and very frequent pulse; but such debility is rarely met with except as the consequence of diminution in the quantity of the circulating fluid, whether from excessive loss of blood or from increased discharges.

476. When exhaustion of the nervous power is accompanied by local disease, whether functional or structural, that state of system exists to which the name of *irritation* is given. It occurs in cases of slow convalescence from fever, in which some local affection has supervened; as an immediate consequence of severe injuries in subjects debilitated by previous disease or bad habits of life; and as a more remote consequence in sound constitutions. In these latter cases, the injury itself produces the same nervous exhaustion which bad habits or previous disease had occasioned in the former.

477. Another example of the action of the nervous system on the circulation is afforded by that temporary arrest of the heart's action known as *syncope*, or fainting. This state may be brought about by any violent shock to the nervous centres, originating from without, as in accidents, or from within, as in violent emotions. Sometimes the heart is paralysed by the shock, and death is the result.

478. The muscular movements of the heart are partly dependent upon the pneumo-gastric nerve; and therefore when the functions of the centre in which this nerve originates are interfered with by

effusions within the cranium, by injuries of the medulla oblongata, or by the circulation of impure blood, the force of the heart's action and the number of its contractions are diminished.

479. The effect produced on the nervous centres by changes in the circulation is more important even than those which the circulation suffers by alterations in the state of the nervous system. The exhaustion which follows strong nervous excitement has its counterpart in that produced by loss of blood. The sudden loss of a large quantity of blood produces syncope or death, partly by depriving the heart of its stimulus, and partly by paralyzing the nervous centres.

480. In healthy persons loss of blood occasions a degree of debility proportioned to the quantity lost; but in persons afflicted with local disease, or of a broken constitution, the debility is accompanied by nervous excitement, and *irritation* results. The same effect follows when the quantity of the circulating fluid is diminished by profuse discharges, such as leucorrhœa or diarrhœa. An excessive and continued drain of natural secretions, as in menorrhagia, and in prolonged suckling, leads to the same result. But the puerperal state, combining, as it does, nervous exhaustion, loss of blood, a local affection, and a sudden change of the equilibrium of the fluids, presents the most vivid picture of that state to which the name of irritation has been given.

481. In this condition of irritation, as in that originating in the nervous centres themselves, the circulation is affected, and we have the frequent and quick pulse easily excited by mental emotion or by strong and sudden impressions on the organs of sense. The functions of the brain also suffer; and we have, according to the degree of irritation, mental excitement, delirium, or mania. The nervous influence conveyed to the muscular system betrays the same derangement under the forms of restlessness, jactitation, convulsions, and spasms in the voluntary muscles, and frequent or irregular breathing, laughing, crying, sighing, sobbing, and yawning, in the muscles of respiration. The nerves of sensation participate in the general derangement of the nervous system, and we have intolerance of light and sound, an excessive sensibility of surface, and acute reflected pains in the walls of the chest and abdomen. The stomach likewise shows its sympathy with the nervous centres by nausea, vomiting, or hiccup.

482. Such are some of the phenomena of the state of irritation—a state which, whether it originate in the nervous system, or in the circulation, displays nearly the same character, and requires the same treatment. It is aggravated by depletion, and relieved by remedies that impart strength while they soothe excitement. A combination of narcotics and tonics, or, if the debility is extreme and the nervous symptoms urgent, of narcotics and stimulants, is the remedy indicated.

483. The influence of the nervous system over muscular movements has already been alluded to, and two classes of movements have been

described, the involuntary and the voluntary; the former excited by certain changes in the condition of the incident or excitor nerves giving rise to corresponding changes in the reflex or motor nerves, and the latter by the will. In health these two sets of muscles execute their appropriate movements; in disease, or in peculiar states of system, the one takes on the character of the other, the involuntary muscles obeying voluntary impulses, and the voluntary muscles performing involuntary contractions.

484. A well-authenticated example of involuntary muscle being subject to the influence of the will occurred in the case of Colonel Townsend, who possessed the extraordinary faculty of stopping the beat of his heart at will; and the same power seems to have existed in one or two other instances.

485. Some of the most striking examples of involuntary actions of voluntary muscles observed in disease are, chorea, hysteria, epilepsy, catalepsy, convulsions, tetanus, hydrophobia. Of these diseases some depend on a direct influence transmitted from the nervous centres, but the majority are examples of a reflex action.

486. When the contractions continue in the same muscles for a certain space of time, producing a fixed and rigid state of the parts affected, they are said to be *tonic*; when the muscles are alternately contracted and relaxed, they are called *clonic*. Tetanus, hydrophobia, and catalepsy are examples of *tonic* spasm; chorea, hysteria, and epilepsy are forms of *clonic* spasm; convulsions are sometimes of one kind and sometimes of the other.

487. In chorea and hysteria, voluntary and involuntary impulses are strangely blended; but the degree of control which the will exercises is widely different in the two cases. When a patient affected with chorea wills a movement, the involuntary action, mixing with the voluntary effort, causes grotesque distortions, and attempts at restraint only increase the action of the muscles; but the movements of the hysteric patient are less grotesque, though more violent, and can often be restrained by a strong effort of the will.

488. Convulsions afford an example of unmixed involuntary contraction. They are commonly a form of reflex action; but when they follow the loss of blood, they probably arise from the sudden removal of that nervous influence which maintains the tone and the equilibrium of the muscles. Hence the flexors, which are the stronger muscles, contract, and the extensors, being put on the stretch, are in their turn brought into action, and thus an alternate or clonic contraction of the two sets of muscles takes place; but as there is a balance of strength in favour of the flexor muscles, they at length overpower the extensors, and if death ensue, the fingers and toes are found flexed.

489. Convulsions, therefore, are often the last movements of a living body. They are also the most efficient cause of restoration from syncope; for when the circulation has nearly ceased, and the heart does

not receive blood enough to excite it to action, the contraction of the muscles of the limbs forces the blood of the veins towards the heart, and thus tends to re-establish the circulation. The trembling of the limbs from cold, which is a low degree of convulsion, has the same beneficial effect in restoring the circulation of the blood.

490. The nerves of sensation, like those of voluntary motion, are subject to various derangements. Sensation may be lost (anæsthesia), or exalted (hyperæsthesia), or perverted (nosæsthesia). The loss of sensation which sometimes accompanies paralysis of the voluntary muscles is an example of anæsthesia affecting the nerves of touch; and amaurosis, of anæsthesia of the optic nerve. Intolerance of light and sound, and violent hunger and thirst, are examples of hyperæsthesia. The strange pains and anomalous sensations of hysteria and hypochondriasis, are instances of nosæsthesia. In some hysteric females there appears to be diminished sensibility of the nerves of touch, with increased sensibility of other nerves, the sensibility appearing to be withdrawn from the one to be concentrated in the other. Hence some of the most remarkable of phenomena of nervous affections, and of that state induced by the manipulations of the mesmeriser.

491. There still remain to be considered two functions closely dependent upon the nerves, though connected more or less with the changes which are constantly taking place in the fluids and textures of the frame:—the generation of heat and electricity.

492. *Animal heat.*—The cause of animal heat is still a subject of controversy; but the experiments of Depretz and Dulong, as interpreted by Liebig, have rendered it in the highest degree probable that the production of animal heat is entirely due to the combination of the carbon and hydrogen of the blood with the oxygen of the air. This combination, which was formerly supposed to take place in the lungs, is now believed to occur in the minute capillaries of every part of the system by means of the oxygen absorbed in interchange for the carbonic acid expelled from the lungs. It has also been shown experimentally that the nerves exercise an important influence upon the temperature of the body. Though the precise effect which each of these causes has in the production of animal heat has not yet been determined, observation has shown that its amount varies greatly in different states of the system.

493. The temperature of these internal parts which are most accessible—viz., the mouth and rectum—is about $97\frac{1}{2}^{\circ}$ or $98\frac{1}{2}^{\circ}$ Fahr. A difference, however, has been observed to exist in parts near to and remote from the centre of the circulation; thus, Dr. J. Davy observed, that the temperature of the axilla being 98° F., that of the loins was $96\frac{1}{2}^{\circ}$, that of the thigh 94° , that of the leg 93° to 91° , and that of the sole of the foot 90° . The temperature of the blood was about 101° .

494. In disease, remarkable deviations from the standard temperature have been observed, both in excess and in defect. The temperature of inflamed parts has been found as high as 105° or 107° , and that

of the whole surface has reached the same degree in some cases of fever, and risen still higher (to 112°) in scarlatina. On the other hand, in cases of morbus cæruleus and in the cholera, the temperature has been observed as low as $77\frac{1}{2}^{\circ}$ or 77° .

495. In most cases of disease, the increase and decrease of temperature bear a pretty exact proportion to the rapidity or slowness of the circulation; but remarkable exceptions to this rule have been observed. Thus, Dr. Hastings, in his work on inflammation, states, that in several cases of fever the pulse was remarkably infrequent, while the temperature was very high; the pulse, for instance, being 45 when the temperature of the body was 105° . In cases of hydrocephalus the same observer has counted a pulse of 60 or 70, with a temperature of 100° .

496. *Electricity*.—The facts ascertained with regard to free electricity in man are the following:—As a general rule the electricity is positive, but in the female more frequently negative than in the male; it is more abundant in persons of a sanguine temperament than in the lymphatic; greater in the evening than in the morning; greater when the temperature of the body is high than when it is low; it is increased by spirituous liquors, and reduced to zero in rheumatic affections. The free electricity of the body is generally of very feeble intensity; but in peculiar states of system the body has given out sparks in great abundance. Further, and independent of all mechanical and chemical actions in the body or external to it, there exists in the nerves of all animals a natural electricity, circulating in closed currents from the central parts of the nerve fibres which are in a — condition, to the surface which is in a + state. There is, in fact, an electrical antagonism between the transverse and vertical sections of the nerve. The same phenomena are presented in muscular fibres, but they are no doubt due to the nerves contained within them.

5. MENTAL PHYSIOLOGY AND PATHOLOGY.

497. Some of the most difficult and responsible duties which the physician is called upon to perform have relation to the mind. Disorders of the mind, more or less permanent, and more or less dependent upon bodily diseases, are of frequent occurrence in the practice of all physicians; and mental diseases engage the exclusive attention of a not inconsiderable body of medical practitioners. Hence the physiology and pathology of the mind have claims on the attention of the medical man not inferior to those advanced by the physiology and pathology of the material structures.

498. Indeed the brain, the material instrument of the mind, built up and nourished as other structures are, deriving its supply of blood from the same centre, and through the same intricate network of arteries and veins, is affected by every change in the composition of the blood, and by every derangement in the balance of the circulation; and is subject to all the functional and structural diseases to which the other organs of the body are liable.

499. The brain, and the nervous system, as parts of the material fabric of the body, must also be subject to all those influences, external and internal, which have been already examined (§ 4 to 89). Between brain and brain, as between body and body, it is reasonable to expect important original and acquired differences; original differences in size, shape, and consistency, and others more difficult to define, resulting from temperament, diathesis, and idiosyncrasy, from age, sex, and race; and acquired differences, due to climate, residence in town or country, education, occupation, and habits of life.

500. Many of these physical agents act upon the brain and nervous system more promptly and forcibly than on any other part of the body. This is especially true of excitement, fatigue, dissipation, intemperance, and inaction. Many poisonous agents, too, take effect chiefly upon the brain and nervous system, and prove fatal by the disturbance in their functions to which they give rise.

501. Again, the brain, as the mind's material instrument, is subject to inaction, to wholesome exercise, or to over exertion, according as education is neglected or enforced in early life, and in proportion to the necessity which exists for self-culture and labour in after life.

502. If, then, we consider the brain in this twofold point of view (as a constituent part of the body, subject to all the influences by which it is affected, and as the material organ of the mind developed by mental exercise), we shall be prepared to find the differences between mind and mind, whether in health or disease, equalling and even surpassing those already pointed out (§ 89) as existing between body and body.

503. The brain, as has been already stated (§ 433), viewed as the organ of the mind, is the centre both of intelligence and of action. To it all sensations are referred, and from it all volitions emanate. It performs these functions subject to the condition that the nervous communication in both directions (inwards from the organ of sense, and outwards to the muscles) shall be unbroken.

504. Each organ of sense consists of three parts: 1, an external apparatus on which the impression of the object is made by contact, as in the senses of touch, taste, and smell, or by intermediate undulations or vibrations, as in the senses of sight and hearing; 2, a nerve transmitting this impression to the brain; and, 3, a portion of the brain itself set apart, as is probable, for taking cognizance of the impression thus produced and conveyed; and, as in the case of the two eyes, combining two distinct impressions into a single sensation. On the other hand, each distinct apparatus of volition, as the organs of speech and organs of locomotion, consist, in all probability, of similar constituent parts: 1, of a portion of brain in which the act of volition originates; 2, of a nerve or nerves by which the mandate is conveyed; and, 3, of a collection of muscles by which the mandate thus originated and thus transmitted, is obeyed.

505. The parts of the brain to which the several sensations are conveyed, and from which the mandates of the will issue, are subject to original deficiency no less than to the disabling effects of disease. Some persons, for instance, are unable to distinguish colours, others are equally incapable of recognising musical notes and intervals; and on the other hand, a few cases are recorded of persons with perfect hearing and well-formed organs of speech, who have never been able to articulate. Blindness from disease of the parts of the brain to which the optic nerves join themselves, and loss of speech from apoplexy affecting the base of the brain near the origin of the lingual nerves, are familiar examples of the disabling consequences of disease.

506. In tracing the path of sensation from without to within—from the impression on the organ of sense to the part of the brain which takes cognizance of it—we come in contact, so to speak, with two important operations, or faculties of the mind, *volition* and *memory*.

507. Volition plays a most important part not merely in directing all those muscular movements by which we make provision for our subsistence and communicate with our fellows, but also in perfecting the work of sensation begun by the organs of sense. Without that act of volition, which, when it is brought to bear upon our sensations constitutes *attention*, no external object could be distinctly perceived, nor could it be afterwards recollected. On the other hand, without that power of reproducing sensations which constitutes *memory*, the more complicated acts of volition could have no existence. Hence, volition and memory would appear to be closely linked together, to have their material instruments in parts of the brain nearly connected with each other, and to be subject to be simultaneously impaired by disease. But the will and the memory are not limited in their operations to muscular movements on the one hand, and bodily sensations on the other; for the will also directs and controls the operations of the mind, and the memory stores up and reproduces not sensations only, but trains of thought, processes of reasoning, complicated transactions, and the workings of emotion and passion.

508. It has just been stated that impressions made upon the senses, in order that the mind may take cognizance of them, must be accompanied by an act of volition known as *attention*. Now, whenever an object presented to the senses is thus attended to, it is said to be perceived; in other words, sensation is converted into *perception*.

509. Perceptions vary greatly in intensity in different persons; also in the same person at different periods of life, and in different states of body; and there is the same difference in regard to that reproduction of perceptions which constitutes memory or recollection. In some persons, perceptions are reproduced with extraordinary quickness, vividness, and fidelity, while in others they can scarcely be reproduced at all; and one of the principal features of the mind in old age, and of the unsoundness of mind peculiar to the aged, consists in the obtuseness

of the perceptions, and the extraordinary difficulty with which they are recalled or reproduced. Perception and memory, indeed, bear a pretty exact relation the one to the other. Those objects which were best perceived are best remembered, and those which scarcely made any impression when presented to the senses are not reproduced at all, or with great indistinctness.

510. In a few rarely-gifted individuals, perceptions are reproduced with such vividness and fidelity that the objects formerly perceived, are, so to speak, painted upon the retina, or transferred to the other organs of sense, by an effort from within. This perfect operation of memory is sometimes attributed to the imagination, and is termed *conception*. This power of depicting objects on the retina by the force of thought, belonged to the poet Goethe during the whole of his life; and the Editor of this work had the same faculty during his childhood.

511. When this same transfereuce of thought to the organ of sense is involuntary, it constitutes *illusion*, of which the most familiar form is *spectral illusion*—a subject of great importance in relation to certain forms of unsound mind.

512. Objects of sense, then, make impressions of varying intensity according to the degree of attention bestowed upon them. When the mind is preoccupied by a train of thought, objects presented to the senses make little or no impression, and are neither observed nor remembered; and this preoccupation of the mind, which renders the same man unobservant of the things going on about him, doubtless occurs in certain forms of unsound mind, and accounts for a part of their phenomena. This preoccupation carried to excess constitutes *absence of mind*, and explains the eccentric acts of absent men, and some of the unaccountable proceedings of madmen.

513. By that effort of the will, then, which we call *attention*, we are able to perceive objects with more distinctness, and to reproduce perceptions with more facility. Now, sensations do not come into the mind singly, but in groups; and our knowledge and experience of the objects which surround us is compounded of many sensations. Thus, an orange produces a number of different sensations at the same time—a sensation of size, of shape, of colour, of weight, of odour, of taste; and it is by an effort of the *will* alone, in other words, by an effort of *attention*, that we can single out one of these several sensations of which the word orange has been made the representative, and make it a separate subject of contemplation. This separation of one sensation from another is called *abstraction*, and the exercise of the mind upon sensations thus separated is called *abstract reasoning*.

514. The necessity of such a power of abstraction arises out of the existence of another and directly opposite faculty, or mode of action, of the mind—the faculty of *association*. As *attention* separates, and so to speak, *isolates* sensations which are commonly combined, so does *association* combine, and cause to reappear together, or in rapid suc-

cession, those sensations or ideas which either took place simultaneously or successively, or which have in any way been previously conjoined.

515. This tendency of sensations and ideas to appear in the connection or succession in which they had previously entered the mind, can be broken through only by an effort of volition; but when such effort of volition has repeatedly placed in combination or succession a number of sensations or ideas, this very combination or succession, though originally forced and voluntary, soon falls under the influence of the law of *association*, and a fresh effort of the will is necessary to separate and disarrange them.

516. That repetition of sensations, thoughts, or movements, at first distinct, difficult, and voluntary, which ultimately transfers them from the dominion of attention to that of association, is called *habit*. When this transference is complete a man is said to become the slave of association or of habit.

517. By a faculty allied to, if not identical with, this of association, the mind also passes from one thought, or recollection of an agreeable or of a painful character, to another of the same complexion.

518. The attention alternately, or successively directed to different sensations or ideas leads to a further act of the mind for which a particular mental faculty, known as the faculty of *comparison*, is supposed to be required. This faculty, in a being already supposed to be endowed with free will, implies a power of choice.

519. This faculty of comparison is essential to the acquisition of knowledge, as well as to the regulation of our actions. The impressions made upon one sense must be compared with those made upon another; the eye must correct the ear, and the sense of touch the eye, in order that we may form distinct and precise notions of the properties of external objects. The sensations or ideas reproduced by the memory must also be contrasted with those produced by objects present to the senses, in order that we may not confound the creations of our own minds with realities. In persons of unsound mind, this power of comparison is lost, and the unfounded thoughts which spring up in the mind are taken for realities.

520. Without the exercise of this faculty of comparison it would be impossible to make a single step in art or science; and orderly arrangement and scientific classification are wholly dependent upon it.

521. The objects grouped together by the aid of this faculty are either the same or similar; that is to say, all their properties agree or only some of them. Hence, we are able to say of any one object contained in a group or class what we are able to say of every other object, either in respect of all its properties, or of that one property which formed the basis of the classification. Now this twofold process of constructing groups of individuals, and then affirming of the individuals that they possess the property or properties which first led to their

being thrown into groups, is the whole secret of our knowledge—of science in its highest and in its lowest forms.

522. When the objects thus grouped together are simple in themselves and exactly alike, and when the words we use to describe or define them can be understood only in one sense, our knowledge is absolutely certain: but when the objects are complex and only similar, and our words less precise, we are obliged to content ourselves with knowledge of a less definite and exact character. Now, there is only one class of objects to which the first part of this description applies, and these objects are mere *abstractions*; that is to say, they consist of the universal relations, as distinct from the special properties, of matter, such as space, time, number, position, direction; with regard to which we can make certain assertions that can neither be doubted nor denied, and lay down certain definitions that cannot be misunderstood: and *Reason*, availing herself of these *assertions* or *axioms*, as they are called, and of these plain definitions, and making use of a language at once condensed and intelligible, has built up that vast and wonderful fabric of abstract knowledge known as *mathematics*.

523. Every act of comparison between one object and another, or between one object and the group of objects to which it belongs, results in an inference expressed or understood; and these acts of comparison, taken with the inference drawn from them, constitute a process of *reasoning*. So that *reason* may be defined as the faculty by which we draw inferences from comparisons.

524. Now every process of reasoning, however complicated it may seem to be, consists of two assertions, containing the elements of a comparison, and an inference. The first assertion is, that a *group* of objects possesses this or that *property* or *properties*; the second, that an *individual* object belongs to that group, and the inference is, that, as a necessary and inevitable consequence, this individual object possesses the properties of the group to which it is asserted to belong. These two assertions are technically called *premisses* (major and minor), and these, with the conclusion or inference, constitute what logicians call a *syllogism*.

525. It is of the first importance to understand that when fallacies creep into a process of reasoning, they are to be found in the premisses, from which the inference, or conclusion, is a necessary consequence: and this observation applies to the operations of the unsound, as well as of the sound mind; for though there are several forms of unsound mind in which the power of making comparisons and of drawing inferences is lost or wanting, there are others in which the power of drawing correct inferences is retained; the defective reasoning consisting in erroneous premisses dictated by distorted perceptions, a perverted imagination, or over-excited feelings.

526. The correctness of this explanation will be readily recognised in those cases of monomania, or partial intellectual mania, in which

the patient believes that his body has been changed from flesh and blood into some other material, such as glass or butter. Such a patient will not merely reason correctly on this false and almost incredible assumption, but he will shape some at least of his actions in obedience to the inference correctly drawn from the false premiss.

527. There are, however, as has been already stated, other forms of mental unsoundness in which the reasoning faculty is so impaired, that even the formation of a simple syllogism is impossible; in which the reason, in common with the other faculties, is in a state of complete decay. This happens in extreme cases of *dementia* and in the *dementia* of old age. Again, there are cases of *idiocy*, or of extreme *imbecility*, in which the reasoning faculty has never been developed, even to the extent of comprehending or employing the simplest and easiest arguments. There is also another condition of the unsound mind, characterised by complete *incoherence*, when all the faculties are in a state of intense excitement and hurry, so that there is not, so to speak, breathing-time for the deliberate exercise of thought or reflection.

528. Some account has now been given of those faculties of the mind by which we obtain knowledge. Mention has been made of the *senses* as the prime source of all knowledge; of *sensations*, as the impress of outward objects on the sensorium; of *perceptions*, as sensations strengthened and recognised by attention; of *conception*, as sensations producible at will, without a corresponding outward object, but simply by the intense operation of the mind itself; of *memory*, as the faculty by which sensations are reproduced; of *attention*, as that by which sensations are strengthened, separated, or arbitrarily combined; of *association*, as the faculty by which sensations are linked together in their original or acquired relations; of *comparison*, as the faculty by which sensations or ideas are contrasted; and, lastly, of *reason*, as the faculty by which conclusions or inferences are drawn from premisses.

529. By the aid of these faculties alone we might have accumulated knowledge, and created arts and sciences; we might have obtained much acquaintance with the properties of matter, and some mastery over it; we might have made some advances in civilization; but without that inventive, suggestive, anticipating, exaggerating faculty to which we give the name of *imagination* or *fancy*, hypothesis, theory, poetry, and high art would have been impossible, and several forms of unsound intellect unknown.

530. The province of this faculty of the mind would seem to be to select and arrange, in new and arbitrary combinations, forms, colours, sounds, descriptive words and phrases, and even the simplest and most abstract facts of science, with a view to please, persuade, and amuse; or, to speak more generally, to excite in the minds of others, by every kind of skillful combination and contrast, emotions pleasurable or painful. The most arbitrary of these combinations, when relating to matters of science, are termed hypotheses; when employed upon trivial subjects, and directed to mere amusement, they are known as wit and humour.

For practical purposes it may be sufficient to state that men are said to exercise the imagination, or fancy, whenever, without the intention to deceive, they make assertions incapable of proof, or unsupported by the concurrent testimony of other persons having the same opportunities of observation or experience with themselves.

531. Of the intellectual faculties, the imagination is that which has the strongest affinity with the emotions and passions, for its operations, like theirs, are attended by excitement. It seems, indeed, to hold a middle place between the intellect on the one hand, and the passions on the other ; adding vigour and originality to thought, whilst it lends attraction to objects of desire, and gives intensity to every effort by which they can be compassed.

532. The powers or faculties of sensation, perception, conception, comparison, reasoning, and imagination, make up the sum of what are commonly known as the intellectual faculties. They may all be said to be dependent, primarily, on the senses, and to subserve the work of contemplation ; but the faculties now to be considered lead directly to action. They are known as *passions* and *emotions*, as active and passive emotions, or as propensities and sentiments.

533. Between the passions and the emotions it is not easy to draw an exact line of demarcation ; but it is usual to characterise *benevolence*, *veneration*, *hope*, *fear*, *grief*, *remorse*, as emotions ; *lust*, *anger*, *ambition*, *vanity*, as passions. Although there is undoubtedly a distinction between them, yet they resemble each other in this—that they arise in the mind spontaneously whenever the object calculated to excite them is presented to it, whether from without by the *senses*, or from within by the *memory*. They do not arise from any process of *reasoning*, or from any exercise of comparison, but resemble instincts in the rapidity with which they spring up, the certainty with which they are directed to their objects, and the wonderful promptitude with which they act. When very strongly developed, or excited, they act even in persons of sound mind with such promptitude as to forestall the exercise of reason. Indeed *reason*, in the sense of the *reasoning faculty*, is in the very nature of things too slow in its movements to form an efficient check to the passions, or a safe guide to the emotions. To check the one and to regulate the other is the work of *conscience*, an original and innate faculty, but one in some degree formed and moulded by instruction communicated to us in early life, and modified by the habits of society. Acting, as it does, with all the quickness and precision of an instinct, it is the only faculty prepared to offer effectual resistance to the feelings and passions, simply because it is the only faculty which acts as promptly as themselves.

534. As the intellectual faculties exist both originally, and as a consequence of habit and culture, in very different proportions in different persons, so also do the *emotions* and *passions* ; and just as education gives acuteness to the perceptive and reasoning faculties, indulgence gives

power to the emotions and passions, and restraint, on grounds of reason and right, supremacy to the conscience.

535. This sketch of the mind in its sound state would be incomplete if some allusion were not made to those first truths in which all sane men believe, without being led to that belief by any conscious operations of the intellect. These are a belief in our own personal identity; in the real existence of objects of sense; in the uniformity of the operations of nature; and in the necessary connection of cause and effect.

536. Having thus, with the brevity imposed by the narrow limits of this work, considered the faculties by means of which we gain and impart knowledge, the emotions and passions by which we are moved to action, the conscience by which we are restrained, and the first truths without a belief in which life itself could scarcely be preserved; our attention will naturally be directed, in the next place, to certain conditions of the senses and of the mind which, while they do not constitute mental unsoundness, often enter into that state as constituent parts, and serve to throw valuable light upon it.

537. The first of these conditions is *illusion* of the senses, among which *spectral illusions* are the most interesting.

538. All the senses without exception may become the seats of abnormal impressions—the eye of bright or dark spots, and circles of colours; the ear of humming, hissing, or blowing sounds, or distinct musical notes; the taste, of bitter, salt, or sour savours; the sense of smell, of unreal odours; and the sense of touch, of a feeling of local pressure, of heat or cold, of creeping, itching, pricking, and tingling. These false sensations are due to changes in the circulation through the brain, or through the nerve of sense.

539. Objects of sense are also apt to be exaggerated, or the reverse, by peculiar states of the organs of sense, or of the brain; and especially during slight febrile attacks, or in the early stage of convalescence from febrile disorders. Visible objects, for instance, are either magnified to enormous dimensions, or diminished to the smallest possible size; and sounds seem lower or louder than they really are.

540. Similar exaggerations often take place under the influence of strong mental emotion, especially fear. A good example of this sort is supplied by the case of a thief to whom, in common with other suspected persons, a stick of a certain length was given, with the assurance that the stick of the thief would grow by supernatural power. The culprit, imagining that his stick had actually increased in length, broke a piece off, and was thus detected. A similar anecdote is told of a farmer, who detected depredations on his corn-bin, by calling his men together, and making them mix up a quantity of feathers in a sieve, assuring them that the feathers would infallibly stick to the hair of the thief. After a short time, one of the men raised his hand repeatedly to his head, and thus betrayed himself.

541. Another affection of the organs of sense allied to true spectral illusions, consists in an extraordinary permanence of impressions made upon the senses by external objects. One instance in which the impressions made by the notes of a bugle remained on the ear for nine months is mentioned by Abercrombie; and a still more remarkable case, in which the spectrum of the sun remained on the retina for ten years, is cited by Feuchtersleben from Boyle.

542. Sometimes impressions made upon the senses are reproduced with great exactness after an interval of time; as was the case with Dr. Ferriar when about the age of fourteen. Any interesting scene which he had witnessed during the day was reproduced with great fidelity, on entering a dark room, and continued visible for some minutes. This reproduction of sensations seems to have been involuntary; but Goethe had the power of producing pictures at will, though unable to dismiss them when he desired to do so.

543. From pictures on the retina, conjured up by an effort of the will, without any corresponding object present to the eye, and from similar pictures produced without an effort of the will, in consequence of vivid impressions previously made, the transition is easy and natural to those illusions of the senses, and especially of the sense of sight, over which the individual affected by them has no control, and which have also no relation to objects previously perceived. Such illusions are of special interest, inasmuch as, though quite compatible with perfect sanity, they occur in many cases of unsound mind.

544. Several interesting cases of ocular spectra, so closely resembling real objects as to be distinguished only by the most careful exercise of comparison and judgment, are recorded in Sir David Brewster's "Natural Magic," and Sir Walter Scott's "Demonology and Witchcraft." That of Nicolai, the Berlin bookseller, is not the least remarkable. In the case of a lady, whom Sir David Brewster designates as Mrs. A——, the sense of hearing was first affected, her husband seeming to speak to her, though he was not near her. The sense of sight was next the subject of similar impositions. At one time, she saw the spectre of her husband; at another, that of a near relation enveloped in grave-clothes; at a third, that of a deceased friend; at another time, a spectral cat. But whether the ear or the eye was the subject of the illusion, the mind was fully aware of the real seat and nature of the deception.

545. The woman in the red cloak, seen by Mr. Abernethy's patient, the ghastly spectacle which appeared to Lord Castlereagh at night, and the figurantes in green who drove Sir Walter Scott's young man of fortune out of England, all belong to this class.

546. Many remarkable men have been subject to these false impressions. The list comprises the names of Luther, Oliver Cromwell, Pascal, Goethe, Cellini, and Schwedenborg. The student worn out by application, the religious enthusiast exhausted by watching and fasting, Silvio Pellico in his solitary confinement, the sailors of the 'Medusa'

suffering from mingled privation and excitement, the drunkard and the opium-eater, and persons under the influence of poisons of the narcotico-acrid class, have all afforded examples of spectral illusion.

547. Spectral illusions, too, are not uncommon in females at or about the change of life, when suffering from the group of nervous symptoms so common at that period ; and in the disease known as *mimosis inquieta*, by whatever cause produced.

548. Lastly, spectral illusions are of common occurrence in dreams, in delirium, and in madness ; so common are they in this last condition, that Esquirol estimates at 80 per cent. the proportion of persons so afflicted, who are subject to illusions of one or other of the senses.

549. As illusions of the senses may occur both in persons of sound and of unsound mind, it is important to distinguish between them. The difference consists in this, that the madman believes in the reality of these false perceptions, while the sane man corrects them more or less promptly by the other senses, or by some other effort of comparison. There are, indeed, two ways in which these false perceptions may be corrected: 1, by the other senses, as in a case mentioned by Abercrombie, in which the true nature of a spectral illusion was discovered, by observing that the lock of a door was seen through the spectral figure ; and 2, by a comparison with the perceptions of other persons, as in Mr. Abernethy's case of the woman in red. A blind patient of the Editor, though in no danger of misunderstanding the real nature of his spectral illusions, was always struck with the circumstance that his figures moved about quite silently. The man of unsound mind neglects all these means of undeceiving himself, or is unable to use them ; or, if he entertain any doubt at all, he has some false reason to assign to himself in favour of the reality of the supposed object of sense.

550. Spectral illusions can sometimes be traced to thoughts or wishes which have previously passed through the mind. A patient of the Editor, while recovering from a slight attack of fever, preceded by a severe family affliction, slept during the heat of summer in a room commanding a view of a large pond. One day he was seized with a great desire to bathe, and on the evening of that day a spectre presented itself at his bed-side, drew aside the curtains, and invited him to the water. This fact is rendered the more interesting by the circumstance, that though the patient's mind was so far recovered as to allow of his calmly reasoning upon the occurrence, his mood of mind and expression of countenance changed in an instant, and he affirmed with great energy his intention to accompany the spectre should it appear to him again. A similar illustration of the occasional dependence of spectral illusions on the natural workings of the mind was afforded by an old lady, also a patient of the Editor, who on two occasions, under the apprehension of the fatal issue of severe attacks of illness in her children, saw the whole paraphernalia of a funeral cross her room.

551. In some forms of unsound mind, especially in that form known

as *incoherence*, it is probable that illusions of the organs of sense succeed each other with a rapidity only to be compared with the hurry of the thoughts to which the patient gives verbal utterance.

552. Considerations of great interest and practical importance connect themselves with the subject of spectral illusions.—1. They are independent of the will; for they form the very staple of dreams in which the will is suspended, and they appear to the waking man not merely without the will but in spite of it. 2. They are sometimes the false impressious of dreams continued in the waking state. 3. They are not merely vivid reproductions of former impressions on the senses, but new combinations and creations. 4. They often occur in persons in no way remarkable for talent or imagination. 5. They are often dependent on such mere changes in the balance of the circulation through the brain as occur in sleep, or in comparatively trivial departures from health, as in the case of Nicolai, in whom they were clearly traceable to the suppression of a hæmorrhoidal discharge, and the immediate excitement of a fit of passion. 6. They are not, as it would not be unnatural to suppose them to be, mere reflex impressions on the retina, originating in the part of the brain in which perception takes place, and conveyed back through the optic nerve; for they have been shown to be present in blind persons, and in cases in which the optic nerve has been found so injured or diseased as to be unable to perform its proper function.

553. The bearing of these facts upon the phenomena of unsound mind is obvious. If a change in the state of that part of the brain by which impressions on the senses are perceived, or of the whole brain, can conjure up illusions of the senses so like real things as to require a strong effort of the sound mind to distinguish them, it is reasonable to suppose that those parts of the brain which bear to thought, emotion, and passion, the same relation as these perceiving portions do to sensation, or the entire brain, as the case may be, may undergo such changes as shall generate involuntary imaginations having no foundation in fact, words without meaning, emotions springing from no sufficient cause, and passions admitting of no control.

554. The same impressions on the organs of sense which, when they occur to waking persons, are called illusions, form, as already stated, the very staple of our dreams, which have an air of reality, partly on account of the vividness of the impressions, and partly from not being corrected, as in a waking state, by the judgment. But this is true, not only of impressions on the senses: it holds good equally of mental operations, which often have all the reality of similar operations voluntarily and consciously performed in our waking state. It would seem, therefore, that that change in the state of the brain, whatever it be, which in waking persons occasions *illusions* of the senses, gives rise during sleep to every species of mental *delusion*.

555. These two terms, *Illusion* and *Delusion*, are here contrasted; and it is important that they should not be confounded. The distinc-

tion between them will be readily understood by the addition of three words to each:—an *illusion* of the senses, a *delusion* of the mind. The word *phantasm* may be used as a synonym of illusion. The term *hallucination* is sometimes employed in the sense of illusion, sometimes of delusion. It ought therefore to be allowed to fall into disuse. When an illusion of the senses continues to be mistaken for a real sensation, through inability to distinguish the one from the other, it becomes a delusion.

556. *Dreaming* is a state of mind in which illusions of the senses and delusions of the mind arise spontaneously while the senses are closed to the external world, and every voluntary effort of the mind is suspended, or very imperfectly exercised.

557. Many dreams have for their exciting cause some bodily sensation, which becomes blended with fanciful accompaniments. Thus a blister applied to the head suggests to a sleeping man a dream of being scalped by savages; and a loud noise, a dream of being shot as a deserter. And, wonderful to relate, the sensation which really gives rise to the dream may seem to be the last link in a chain of events which would have occupied hours, days, or even years. The sensations caused by an oppressed stomach, or loaded rectum, or a full bladder, may link themselves in like manner with imaginary scenes more or less appropriate. The most painful of the dreams due to these causes are known as *nightmares*. The oppression at the stomach is converted into a hideous personality, from whose weight and pressure there is no escape, and the uneasy sensations in the rectum or bladder are woven into the texture of a dream, in which the impossibility of obtaining relief plays a prominent part. Excitement of the genital organs also gives rise to its own peculiar class of dreams. But these uneasy sensations sometimes give rise to dreams which resemble the sensation itself, only in the one particular of being painful or distressing. Thus a painful tumour or diseased hip-joint may merely occasion distressing dreams having no reference whatever to the pain or to the part affected.

558. Recent impressions on the senses, or recent transactions in which the sleeper has been engaged, also stimulate the fancy to the invention of connected histories of unreal occurrences. Thus, a patient of the Editor, suffering from obstinate colic, which required the use of mechanical means, after having received an encouraging opinion of his case, fell asleep under the influence of opium, and dreamed that his doctor was an engineer to a railway in which he was interested, and had assured him that there were no engineering difficulties which might not be easily overcome.

559. In many persons of unsound mind the mental operations bear a resemblance to this class of dreams too obvious to be overlooked. Real sensations are mixed up, as in dreaming, with unreal accompaniments; and real events passing in the world receive fanciful interpretations, or are forced into unnatural relationship with their own

thoughts. Thus the dream of the patient just cited finds a parallel in the waking fancy of a speculating madman who came also under the Editor's notice, and who, when railroads, the Oregon dispute, and the Chiua war were dividing public attention, wanted to establish a company to run a railroad from Oregon to China.

560. There are many striking illustrations of this analogy between dreaming and madness in the painfully-interesting autobiography of a religious maniac. The cold air which blows upon him as he attempts to suffocate himself, in obedience to the spirits that speak within him, becomes the breath of his sisters cooling him, and encouraging him to go through with his task. The familiar sensation of water trickling down the back is at once converted into the crystal tears of his father, whose venerable countenance he sees bending over him. His head is shaved, and he grieves because he has "received the tonsure of the Roman Catholic priesthood, a mark of the beast." The jets of gas from the fireplace become the utterance of his father's spirit, attempting to save him, but constantly obliged to return to be purified in hell-fire, from the contamination of his foul thoughts. The lowing of the cattle conveys to him articulate sounds and sentences, and the chair grating against the wall speaks to him in his father's voice.

561. Another convalescent from religious mania, informed the Editor, that he was in the habit of looking upon his keeper at one moment as the Deity, at another moment as a man like himself; and that he habitually converted his footsteps into articulate words and phrases, and sometimes into commands to strike him. Believing obedience to these commands to be his duty, he was surprised and confounded to find his violence resisted.

562. The analogy between dreaming and insanity is strikingly illustrated by a case mentioned by Dr. Gregory, where insanity passed, so to speak, into dreaming; the maniac patient, for a week after his recovery, being harassed during sleep by the rapid and tumultuous thoughts, and violent passions, which had agitated him during his insanity.

563. Dreams are sometimes accompanied by voluntary acts, and persons talk or walk in their sleep, or even commit acts of fatal violence in their half-waking state, in pursuance of the train of thought by which the mind is occupied.

564. Closely allied to this last-mentioned class of dreams is the state known as *somnambulism*, or *sleep-walking*, of which there are several forms and varieties. In one form, the somnambulist merely goes through, with the precision of an automaton, a succession of acts which he is accustomed to do in his waking state; in another form, he performs feats, and runs risks in doing them, which he would shudder to think of were he awake. He walks on the edge of a precipice, or on the top of a lofty building; or he will accomplish some intellectual task which had baffled him when awake.

565. Between this state of somnambulism and some forms of unsound mind there are analogies worth noting. In both there is sometimes a remarkable increase of talent, in both a complete change of character, and in both a distinct and separate affection of the intellect and of the moral faculties—an intellectual and moral somnambulism, an intellectual and moral insanity.

566. As evincing the change of character which sometimes happens during the sleep-walking state, the case of the Carthusian monk may be cited, who, while awake, was remarkable for simplicity, candour, and probity, but walked almost nightly in his sleep a thief, a robber, and a plunderer of the dead; or that of a pious clergyman, who, in his fits of somnambulism, would steal and hide whatever he could lay his hands upon, and once even plundered his own church; or the case of the suicidal somnambulist mentioned by Ray, who, after being watched for many successive nights, contrived to escape, and was found suspended to a tree by his feet.

567. From dreaming and somnambulism the transition is easy to certain states of mind, due to temporary and transient causes, readily recognised, and having a close resemblance to certain forms of unsoundness; namely, *delirium*, *delirium tremens*, and *drunkenness*.

568. *Febrile Delirium* is present in many acute diseases, in fever and in inflammatory affections of the internal viscera; it also follows upon severe injuries, such as burns, wounds, and fractures, supervenes upon surgical operations, and is a common effect of a great number of poisonous substances. There are two forms of febrile delirium. In the one the patient lies prostrate on his bed, utterly helpless, and muttering indistinctly. This form is present in the advanced stage of most cases of typhus and other fevers, and is known as muttering or typhous delirium. The other form occasionally shows itself in the early stage of fever. It is accompanied by great excitement, and often by great display of strength, and has been sometimes confounded with mania; indeed the resemblance has in some cases been so close, that the patient has been ordered into confinement as a lunatic. This form is called violent or furious delirium.

569. From the first form of delirium the patient is easily roused, by loud speaking, to short efforts of attention, and to the performance of slight muscular movements, such as protrusion of the tongue; but he soon relapses into his previous state. In some cases the attendants are able to discover that the mind is occupied by a dream in which real personages play a consistent part.

570. That form of delirium known as *Delirium tremens* has some peculiarities worth noting. There are three effects of an abuse of spirituous liquors which may be usefully distinguished. The first is the common drinking fit, in which, when the excitement takes the shape of noisy anger, no mischief is done, because there is not power or steadiness enough in the muscles to commit the threatened violence. The

second state has all the characters of a maniacal paroxysm, and is sure to be brought on in certain persons whenever they indulge to excess. It is a dangerous state of violent incoherence. The third form is that commonly known as *Delirium tremens*. It is sometimes the consequence of long habits of drinking abandoned for a time; but in other instances it comes on, as the immediate consequence of a single debauch, in the inhabitants of large towns, enfeebled by sedentary occupations, overwork, or want of proper nourishment.

571. The characteristic symptoms of this state are trembling of the hands and limbs, and sleeplessness, with a pale face and moist skin. The sleeplessness is a constant symptom, and the tremor is rarely absent. The patient is restless, anxious, timid, suspicious, and cunning; commonly fancies himself in a strange place, and under a control from which he is constantly endeavouring to escape; he is harassed and perplexed by spectral illusions and unreal sounds, he is annoyed by strange sounds and threatening voices, and fancies himself surrounded by hideous and loathsome objects, such as toads, serpents, and scorpions. In the midst of all these objects of horror, disgust, and annoyance, his countenance, strange to say, is often calm and composed; he walks about as in a dream, and he will charge a bystander with threatening his life in a tone of the most complete indifference, as if it were quite immaterial whether he fulfilled his threat or not. In other cases, however, the patient's fears and suspicions impel him to acts of violence, and he becomes very dangerous either to himself or others.

572. The interesting and important subject of *unsound mind* is one of such large extent that only the merest outline of it can be given in this place. There are obviously two kinds of mental unsoundness, the one consisting in an imperfect development of the mind, generally coinciding with a defective development of the brain, and often with a stunted or deformed frame, and dating from birth, or manifesting itself in infancy; the other supervening in later life in persons previously of sound intellect.

573. The first of these forms of unsound mind is termed *Amentia*, and comprises two sub-classes, *Idiocy* and *Imbecility*, between which there is not so clear a line of demarcation as might be desired. Both terms, however, imply an original defect of intellect, and the first a greater defect than the second. The line may be most conveniently drawn by placing on the one side, as Idiots, all those unfortunate persons who, being otherwise of defective intellect, cannot be taught to speak, on the other side, as Imbeciles, those who can. The class of imbeciles should also include children whose intellectual development has been arrested in infancy or early childhood.

574. The idiot, thus defined, is an imperfectly-developed being, having a mere animal existence, obedient to the simplest calls and impulses of nature, incapable of being taught, altogether dependent upon others for support, and able, at the best, to utter a few articulate sounds, to which no meaning is attached.

575. Imbeciles, on the other hand, possess a certain amount of intelligence, understand what is said to them, and can make themselves understood, remember common events, form habits of decency and propriety, and are equal to common household occupations, or to trades easily acquired. The more intelligent can be taught to read and write, and to do simple sums in arithmetic; and they may even attain to a certain degree of excellence in mechanics, music, and the fine arts; but they cannot acquire the amount of knowledge, or practical skill, or exercise the amount of prudence in the conduct of affairs, or of control over their passions, which are common among persons of their own rank and opportunities. The feeble control which these persons are able to exercise over their passions and propensities, coupled with the imperfect idea which they acquire of moral and legal obligations, accounts for the great number of imbeciles found among the criminal population.

576. Imbeciles in the upper ranks of society, being raised above the temptation to crime, make their defect of character felt by every kind of eccentric and irregular conduct, especially by pecuniary extravagance, arising partly from ignorance of the value of money, and partly from a want of self-control; and by intemperance. Imbeciles among the middle classes furnish their full contingent of fraudulent debtors, swindlers, and forgers.

577. There is, in fact, a moral as well as an intellectual imbecility, counterparts of the moral and intellectual insanity presently to be mentioned; and a general imbecility, combining defective intellectual development with unbridled passions. Striking examples of moral imbecility, characterised by reckless extravagance, and an utter want of perception of the disgrace and wickedness of habitual debt, are to be found among the most eminent poets and prose writers of England.

578. The crimes of imbeciles are characterised by the same insufficiency of motive, the same folly in execution, and the same futile attempts at concealment, which mark other parts of their conduct.

579. Idiots and imbeciles afflicted with every variety of bodily infirmity and deformity, are to be found in certain unhealthy regions in all parts of the world, but especially in low damp spots, shut out from intercourse with neighbours, and subject to the evil of constant intermarriages. The evil reaches its highest pitch of intensity in deep alpine valleys, where the enlargement of the thyroid gland, known as *gôitre*, is superadded to other deformities. The persons so afflicted are called *Cretins*, and their malady is termed *Cretinism*.

580. The second class of unsound states of mind, or those that supervene in later life in persons previously of sound intellect, comprises a greater number of sub-classes than the two forms just considered.

581. Among these sub-classes the one that most resembles idiocy and imbecility is *dementia*, which, as the name implies, consists of a loss of intellect, sudden or gradual: sudden, as when it arises from severe

mental shocks or injury to the head ; gradual, as when it follows severe attacks of fever, of inflammation of the brain, or of mania, and when it attends the decay of strength in the aged (*senile dementia*). Sudden attacks of dementia produce a state of mind nearly allied to idiocy, while those which come on gradually resemble more closely the different degrees of imbecility. Many cases, indeed, which receive the name of dementia are cases of imbecility not recognised as such till the capacity comes to be tested and strained by affairs of difficulty, or till some mental shock develops more completely all the weak points of the character.

582. In this class of cases it is often easy to trace the principal feature of the unsound mind, like a thread, through the whole history of the patient. Thus, an habitual debtor at school becomes an extravagant youth and an embarrassed man ; as an incipient madman, he thinks he has a divine mission involving a large outlay of money ; and he dies, at length, in the full conviction that he is the Saviour of mankind.

583. The cases of dementia which come on most gradually are often attended by epileptic fits, and by slowly-increasing paralysis. The cases which come on suddenly, as the result of severe shocks to the mind, are characterised sometimes by a state of utter mental vacancy, or *fatuity*, sometimes by a condition resembling well-marked imbecility, and sometimes by the fixing of the attention rigidly upon the train of thought which had accompanied the shock.

584. The remaining forms of unsound mind are comprised under the general term *mania*, which also consists of several sub-classes. Those most generally recognised are *general mania*, involving the intellect, passions, and emotions ; *intellectual mania*, involving the intellect chiefly, if not exclusively ; and *moral mania*, involving the moral nature to the exclusion of the intellect. There is another term in common use, especially in courts of law, namely, *lunacy*. It is sometimes used as a synonym of mania, and serves to remind us of a class of cases in which there are intervals of sanity and freedom from excitement. The more correct term for such cases is *mania with lucid intervals*.

585. Mania, whatever the form which it assumes, sometimes comes on suddenly as the result of mental shocks, intense mental excitement, severe injury to the brain, intoxication, or the sun-stroke ; but more frequently it makes its approaches gradually during a period, often of several years' duration, known as the period of *incubation*. This period of imperfectly-developed mania is one of painful consciousness to the patient, and of fearful misgivings or mischievous misunderstandings to the friends. The bodily health suffers with the mind, and the disease assumes its full dimensions under the influence of some temporary excitement or disappointment.

586. *General mania*, or that form in which the intellectual and moral nature are simultaneously affected, may be described as a state

of raving incoherence, combining a rapid succession of thoughts, often brilliant and original, with passionate excitement and intense restlessness. In many of these cases reference is constantly being made, in language of extreme violence and gestures of intense anger, to events that occurred at or about the time of the first seizure.

587. *General intellectual mania*, or that which attacks the intellect alone, is admitted to be of very rare occurrence. There is, however, a form of mania in which some one emotion or passion, such as pride, vanity, or love of gain, obtains such an ascendancy over the mind as to fill it with a host of intellectual delusions. Thus, patients in whom the passion of vanity is greatly excited, appropriate to themselves all the great intellectual performances which they have heard praised; those in whom pride is predominant imagine themselves a series of great men; and those in whom the love of gain is excited believe themselves engaged in extravagant and impossible speculations.

588. *Partial intellectual mania*, or *monomania*, otherwise designated as *melancholia*, admits of being subdivided into two subordinate classes, the one comprising those cases in which the unsoundness is not connected with any bodily sensation, the other in which such a sensation forms an essential part of the malady. These latter cases are sometimes known as *hypochondriasis*, sometimes as *melancholia*.

589. Cases of monomania, disconnected from any uneasy bodily sensation, are of common occurrence. Men who think themselves secretaries to the moon, or objects of persecution, or subjects of plots formed against their lives, belong to this class. In most of these cases the attack is gradual, but, like one form of dementia, they sometimes date from a sudden shock. Such was the case of Simon Brown, the dissenting clergyman, who, having killed a highwayman in a struggle, fancied ever after that the Almighty had deprived him of his immortal soul, and, stranger still, that the reigning monarch had the power of restoring it to him.

590. The second class of cases of partial intellectual mania, or those in which the disease is connected with some disordered bodily sensation, are of very common occurrence, and are remarkable not less for the extreme improbability of the interpretation which the imagination attaches to the sensation than for its pertinacity. These cases are more common in women than in men, and often assume the shape of imaginary pregnancy. Thus, a woman with hydatids in the womb thought herself pregnant by the devil; and two females suffering from adhesion of the intestines after peritonitis, believed, the one, that a whole regiment of soldiers fought and struggled in her belly, the other, that the same narrow space was the scene of frequent interviews between the apostles and evangelists, the patriarchs and the pope. In men the imagination is not less active, nor the delusions less remarkable. Thus, one dyspeptic attributes his discomfort to a Caffre who got into his stomach at the Cape of Good Hope; others to men on horseback; and others again, forgetting their sex, believe, like the

Scythians of old, that they have been transformed into women, and have even become pregnant.

591. Bordering on this form of unsoundness, but less easily traced to disordered bodily sensations, are such cases as those of the man who was afraid of passing his urine lest he should drown the town; or of the men who fancy that they have noses of wax or glass, or feet of straw; perhaps also the case of the woman who was afraid to bend her little finger, believing the world to hang upon it, and that of the gentleman who thought himself the Crystal Palace, and, when parliament decreed its removal, accused it of wishing to destroy him.

592. In the least unreasonable forms which this strange malady assumes, that is to say, when the patients believe that they have frogs, toads, and serpents in their stomachs, cures have often been effected by ingeniously-contrived surgical operations. The complete success of such operations would seem to imply that the uneasy sensations which gave rise to these unsound interpretations may have entirely disappeared, and yet the mental malady remain.

593. One circumstance connected with the class of mental maladies now under consideration, and which applies more or less strictly to all forms of mental unsoundness, is the consistency with which the patient supports the part his fancy has assigned to him. If a man believes himself made of glass, he moves about with caution; if of wax, he avoids the fire and the sun; and if he thinks his head has been turned, he dresses himself accordingly.

594. This form of unsoundness of mind bears an obvious resemblance to that class of dreams which consists in an uneasy bodily sensation dressed up with imaginary accompaniments.

595. Closely allied to this last form of unsoundness, in this as in some other respects, is that class of cases in which, in lieu of an uneasy bodily sensation, there is an uneasy state of mind, due primarily to some painful shock or disappointment; this uneasy state of mind passing into a belief that some particular person, or class of persons, is conspiring against the patient, and, like the uneasy bodily sensation, clothing itself in a dreamy apparel of fanciful accompaniments. Luigi Buranelli and McNaughten were madmen of this class. Buranelli's delusion, however, was purely personal, while McNaughten believed himself an object of persecution to whole classes of the community. As these unsound suspicions are commonly associated with that exaggerated estimate of the importance of certain bodily sensations which constitutes *hypochondriasis*, superficial or careless observers are apt to confound these cases with the more simple and harmless forms of that disease. But experience shows that these patients are very dangerous to society.

596. The form of mania now known as *moral mania* was not recognised till a comparatively recent period. Pinel has the credit of having first pointed it out, and Pritchard of having forcibly directed attention

to it. It consists in "a morbid perversion of the natural feelings, affections, inclinations, temper, habits, and moral dispositions, without any notable lesion of the intellect, or knowing and reasoning faculties, and particularly without any maniacal hallucination." When combined with a similar affection of the intellect it constitutes *general mania*. It usually precedes the intellectual form, the delusions of the intellect commonly springing out of a morbid perversion of the feelings. Let this case be taken as an illustration. A solicitor, who, for many years, had conducted his business to the satisfaction of his partners and his clients, had during that same time tortured an unoffending wife by acts which no author would dare to commit to writing. At length he has an attack of acute mania, in which he claims to be the Deity, the Saviour, the King of England, the heir apparent, and other dignitaries, utterly incompatible with each other. From this attack he recovers, has a speedy relapse, soon shows signs of softening of the brain, and dies imbecile and paralytic.

597. Moral mania, like intellectual mania, may be either *general* or *partial*. Of *general moral mania* Frederick William of Prussia, father of Frederick the Great, affords an excellent example, combining, as he did, drunkenness, household tyranny, religious austerity, disgusting personal habits, and repeated attempts at murder and suicide, with an intellect by no means wanting in power or culture.

598. *Partial moral mania* consists in the excitement of some one passion or propensity to a degree of violence which places it beyond the control of the higher faculties. In many of these cases the intellect and conscience remain intact, leading to struggles of which it is impossible to exaggerate the force or misery. The forms of this partial moral mania most generally recognised are *cleptomania*, or a propensity to theft; *erotomania*, or amorous madness (when it occurs in females, known as *nymphomania*, when in males, as *satyriasis*); *pyromania*, or a propensity to incendiarism; *dipsomania*, or a propensity to drunkenness; *homicidal monomania*; and *suicidal monomania*; to which might be properly added, an irresistible propensity to lying and begging, unconquerable pride, irrepressible vanity, unappeasable gluttony, and that most horrible form of it *lycanthropy*, or wolf-mania. Of these forms of partial moral mania, cleptomania and pyromania are most common in females, the remainder in males; but cases of all the forms may occur in either sex.

599. Partial moral mania, whatever form it assumes, is usually a state of mind of some continuance; but there is a class of cases known as *instinctive mania*, in which the disease manifests itself suddenly and unexpectedly. The form which this instinctive mania most frequently assumes is that of *homicidal monomania*.

600. The history of many of these cases is very remarkable. The victim of the insane violence is either a perfect stranger, or an infant incapable of giving offence, or a near relation, to whom the homicide is tenderly attached. After the fatal act no attempt is made to escape,

the deed is openly confessed, and its legal punishment courted and desired. But this insane impulse may assume a much less simple form; the mad thirst for blood may be a chronic passion, and, like the uneasy bodily sensations and mental states just referred to, may clothe itself in the fantastic garb of monstrous intellectual delusions, as happened in the parricide Dadd.

601. The several forms of mania, general and partial, intellectual and moral, present infinite varieties, and occasion the greatest perplexity to medical men when they are called upon to examine patients suffering from them, to give evidence concerning them, or to sign certificates. This perplexity is greatly increased by the very nature of the legal questions which the physician is expected to answer—questions framed by men who are without experience of madness, and reasonably apprehensive of the injury which society might sustain if those who seem to be criminals should escape direct and speedy punishment: but addressed to men who know what madness is; who think that the truth has higher claims upon them than the safety of the public, or the satisfaction of those ignorant and thoughtless persons whose ready assent to received doctrines constitutes public opinion; and who, it should be added, deem imprisonment for life in a gaol or a madhouse a far more serious matter than death itself.

602. Some advantage may perhaps accrue from an endeavour to bring the leading characteristics of mania together into one point of view. It should be understood, then, that this form of unsoundness consists not in the loss of the mental faculties, but in their perversion; that the senses are the sport of illusions of which the patient is unable to detect the unreality, and the mind of delusions of which he cannot perceive the inconsistency or impossibility; that real sensations become, as in sleep, the materials of imaginary scenes; that the realities by which the patient is surrounded are blended with illusions, and real persons made to undergo curious transformations in obedience to his delusions; and that many of his strange antics and acts of violence are also mixed results of his illusions and delusions. It ought also to be understood that the state of the patient's mind is subject to great variation from external and internal causes; that the transition from one state to another is often as rapid as thought itself; that he is capable of exercising, for considerable intervals of time, an extraordinary control over himself, so as to be able to conceal his delusions; that, though sometimes easily imposed upon, he often evinces, in carrying out his insane purposes, all the forethought and preparation of a sane man; that in his wildest excitement he is often so far conscious of what he is doing as to recollect it many years afterwards, his statements being confirmed by sane persons having cognizance of the facts to which the patient refers; and that he may even be conscious of his state and of the legal relations in which it places him.

For more full and complete information on the physiology and pathology of the mind, the reader is referred to such works as Abercrombie on the Intellectual Powers, or to special treatises on Insanity.

CHAPTER IV.

EXAMINATION OF THE MORE IMPORTANT SYMPTOMS
AND SIGNS OF DISEASE.

603. AMONG the symptoms and signs of disease there is one of such acknowledged importance in the diagnosis and treatment of all diseases, without exception, as to make it a fitting subject for a separate treatise, namely, the pulse. There is also one subject for clinical examination, which, involving, as it does, the employment of the microscope and of chemical reagents, is equally entitled to separate treatment, namely, the urine. Again, the diseases of the heart and lungs are of such frequent occurrence and of such importance in themselves, and the signs which indicate them are so numerous, that these, too, may justly claim to be treated with similar respect. Lastly, there are other symptoms and signs of great value in the diagnosis and treatment of disease which are either less clear in the indications they afford, or less difficult to understand and appreciate, so that it is usually deemed sufficient to handle them together in a general treatise on Symptomatology. Such are the tongue, the sputa, the evacuations from the bowels, the attitude of the body, and the expression of the countenance. These considerations have led to the divisions adopted in the present chapter, in which five leading subjects are treated separately, and the remainder thrown into one group at the end. The contents of the present chapter are: 1, Examination of the Urine; 2, of the Abdomen; 3, of the Chest, and the organs of Respiration and Circulation; 4, of the Pulse; 5, of the Respiration; 6, of other Symptoms and Signs of Disease.

1. THE URINE.

Properties of Healthy Urine.

604. *Physical Properties.*—Healthy urine, recently voided, has the temperature of the body. It is perfectly transparent, and of a light amber colour. Its odour is peculiar, but not unpleasant, and disappears on cooling. Its taste is salt and bitter. Its specific gravity ranges from 1005 to 1033.

605. *Chemical Properties.*—Healthy urine has a slight acid reaction. It remains unchanged when heated to the boiling point. It yields no

precipitates with the mineral acids; but oxalic acid produces a slight cloud of oxalate of lime, and the free alkalies throw down a precipitate of the phosphate of lime. The salts of baryta, silver, and lead, also cause precipitates; and tannin occasions a slight cloudiness.

606. *Effects of Decomposition.*—After standing some time, slight clouds of mucus form in the urine, and gradually fall to the bottom of the vessel. Decomposition soon follows, marked by an unpleasant odour and an alkaline reaction; carbonate of ammonia is formed by decomposition of the urea, and effervesces with acids; and the ammoniaco-magnesian phosphate and phosphate of lime are thrown down. A portion of these salts entangled by mucus form a scum in which we may detect, under the microscope, crystals of ammoniaco-magnesian phosphate mixed with the constituents of mucus and with amorphous phosphate of lime. Decomposition continuing to advance, the odour becomes still more disagreeable, and a blue or grey mould forms on the surface; while prismatic and feathery crystals of triple phosphate, and amorphous deposits of phosphate of lime, collect at the bottom, or cling to the sides of, the vessel.

607. *Constituents of Healthy Urine.*—These may be divided into organic and inorganic. The *organic* constituents consist of urea, uric or lithic acid, hippuric and lactic acids, salts of ammonia, and extractive matters, with small quantities of creatine and creatinine. The *inorganic* constituents consist of carbonic, hydrochloric, sulphuric, and phosphoric acids in combination with the bases, soda, potash, magnesia, and lime, with traces of silica. These organic and inorganic constituents are dissolved or suspended in a variable quantity of water.

608. On account of this variation in the quantity of water, on the one hand, and of the solid constituents due to age, sex, time of day, character of food, and amount of exercise on the other, it is only possible to give an approximate analysis of this fluid. This is done in the following table, which is a rude approximation, in round numbers, to the mean of a considerable number of recorded analyses:—

Water	.	.	.	.	.	950
Urea	.	.	.	.	.	25
Uric Acid	.	.	.	.	.	1
Fixed Salts	.	.	.	.	.	14
Organic Matter	.	.	.	.	.	10

1,000

609. The constituents of the urine obtained from the solid residue, after removing the more variable element of water, are still subject to wide variations even in health, as will be seen from the following table, which is also founded on several analyses.

In 1,000 parts of the solid residue, the greatest, least, and average quantities of the several ingredients were as follows:—

	Max.	Min.	Mean.
Urea	500	300	420
Uric Acid	16	14	15
Extractive Matter, Chloride of Sodium and Salts of Ammonia	509	258	381
Alkaline Sulphates	120	81	103
Alkaline Phosphates	68	45	59
Phosphate of Lime and Magnesia	19	14	16

610. *Quantity voided in Twenty-four Hours.*—This varies in different persons, and in the same person at different times and under different circumstances. The following are some of the estimates of authors:—Haller, 49 oz.; Simon, 45 oz.; Keill, 38 oz.; Christison, 35 oz.; Prout, 32 oz. (30 oz. in summer and 40 oz. in winter); Rayer, 21 to 57 oz.; Dalton's experiments on his own person, $48\frac{1}{2}$ oz. (November), $51\frac{1}{2}$ oz. (June). The average of these experiments and estimates is about 41 oz., or little more than two imperial pints.

611. The quantity of urine in a healthy subject is chiefly determined by the quantity of liquid taken into the stomach; but it is affected by many other causes. It varies inversely as the pulmonary and cutaneous exhalation. Hence it is greater in winter than in summer, in a cold than in a warm atmosphere, in a moist than in a dry state of the air. It is greater during the day than during the same number of hours at night, and it is greater in the morning than in the evening. It is also increased by excitement and anxiety of mind.

612. In disease, also, the quantity of urine is increased whenever the pulmonary and cutaneous transpiration is suppressed, excepting only those cases in which all the secretions are simultaneously diminished by high febrile action. In the cold stage of ague, under strong nervous excitement, and in hysterical paroxysms, an increased flow of urine takes place. This increase, which in extreme cases may amount to 30 or 40 pints daily, is not accompanied by any change in the solid constituents of the urine. But in other cases the increase in the quantity of water is attended by an increase of the solid contents, or by the introduction of an abnormal constituent, such as sugar or chyle.

613. On the other hand, the quantity of the urine is diminished by increase of the cutaneous and pulmonary transpiration, by profuse diarrhoea, in cholera, by hæmorrhage, in dropsy, in many forms of acute inflammation, and in the inflammatory stage of fever. It is suppressed, or greatly diminished, in inflammation of the kidney, and under the operation of the more active irritant poisons.

614. The quantity of the solid constituents of the urine is also subject to considerable differences in healthy persons. The most important constituents, urea and uric acid, are at a maximum in men in the prime of life, less abundant in females, and at a minimum in old age and childhood. They are increased by exercise and diminished by rest, increased under an animal diet, and diminished when vegetable food only is taken.

615. *Density of the Urine.*—The density of healthy urine ranges from 1,005 to 1,033, and averages 1,020 or 1,025. According to Simon, it has a range of from 1,005 to 1,030, and an average of 1,012; and according to Dr. J. C. Gregory a range for middle and adult age of from 1,005 to 1,033. The accurate observations of the last-named observer show that the greatest range in the same individual is 21 degrees; the ordinary range from 1,016 to 1,031. 363 experiments on 50 individuals gave an average of 1,022·5, and in 5 individuals, whose urine was examined between 20 and 50 times each, it was 1,025·2.

616. The density of the urine is greater in males than females; it increases from childhood to manhood, and falls again in old age; it is increased by hot weather, by much exercise, by free perspiration, by a dry diet, by nitrogenous food, and during sleep. It is diminished by cold, by sedentary habits, by a watery diet, by vegetable food, by acids, and by alcoholic fluids. It is at its average in the morning on waking; it falls considerably after breakfast; it rises again gradually after mid-day; it sinks again immediately after dinner, but in a few hours rises higher than at any other time; and in the course of the night gradually returns again towards its average.

617. The urine secreted after the digestion of food differs widely from that formed after fluids have been taken. The former, the “urina chyli,” contains, according to Nysten, thirteen times as much urea, sixteen times as much uric acid, and four times as large a quantity of salts as the latter, the “urina potus.” It has also an alkaline reaction. The first urine passed after a meal with which much water is taken, would probably be found to be nearly allied to the “urina potus,” but to contain somewhat more animal matter.

618. The density of the urine in disease may vary from 1,001 to 1,055; and as the density in health does not appear to fall below 1,005, nor rise above 1,033, it follows that any number less than 1,005 and above 1,033 should be regarded as a sign of disease, and any number approaching either limit ought to attract attention. A less density than 1,005 points to an increase in the quantity of the water, with a diminution of some of the solid constituents. A greater density than 1,033 strongly indicates diabetes, though 1,030—1,035 has been observed in cases of increased secretion with excess of urea.

619. The *solids* discharged in the urine in 24 hours average less than an ounce and a half. In a vigorous healthy adult male they may be taken at two ounces, or nearly 1,000 grains. In disease they have been known to amount to 36 ounces, and to fall as low as 11 grains.

620. The *colour* of healthy urine is inversely as its quantity; when scanty it is high coloured; when abundant, pale. In the morning it is usually of a higher colour than later in the day. In disease, also, the colour of the urine is in proportion to its quantity; but it is materially affected by diseased products. It may be white, or bluish-white, and turbid from the admixture of chyle, milk, mucus, or pus, or of the

earthy phosphates in excess; deep yellow, or greenish yellow, from bile or the cystic oxide; dark red or purplish, from the addition of purpurations, as in inflammatory diseases; yellow-red, as in hectic and the sweating stage of intermittent fevers; brownish or cherry-red, from the admixture of the red particles of the blood; black, from melanic acid; and blue, from the cyanuric acid. Several substances taken with the food, such as rhubarb, madder, beet-root, corn-poppy, and logwood, are also said to tinge the urine red.

621. The natural *odour* of the urine is best perceived when it is scanty and high-coloured; it disappears with dilution. The odour of the urine is altered by some kinds of food, such as asparagus; it is aromatic in many nervous affections; ammoniacal in injuries of the spinal cord; putrid from the admixture of pus or mucus, in diseases of the urinary organs, and in the last stages of putrid fevers; sweetish in diabetes mellitus; and it has the odour of sweetbriar or of violets when it contains cystine, and probably under other circumstances.

622. The *taste* of the urine is perceptibly sweet in well-marked cases of diabetes mellitus.

The Urine in Disease.

623. The abnormal conditions of the urine are of two kinds:—

- (1.) Its normal constituents may be in excess or defect.
- (2.) It may contain substances foreign to its normal composition.

This second class admits of further subdivision as follows:—

(1.) Salts of ammonia and lime, of which the constituents exist in healthy urine, namely, carbonate of ammonia, carbonate of lime, and oxalate of lime.

(2.) Substances which result from the imperfect assimilation of the food, or from the defective power of elimination of the kidney; namely, chyle, fat, milk, sugar, bile, and cystine, to which may be added kystein, found chiefly in the urine of pregnant women.

(3.) Blood; or its constituent red particles, fibrine, and albumen.

(4.) Secretions of the lining membrane of the urinary organs; namely, mucus, and epithelial scales (these exist in small quantity in healthy urine, and belong to the 1st division), and pus; also casts of the urinary tubes.

(5.) Animal secretions derived from neighbouring organs, as semen and the gonorrhœal and leucorrhœal discharges; also entozoa.

(6.) Poisons and medicines, of which the list is almost coextensive with the substances themselves, comprising the principal metallic bases, the non-metallic bodies, the organic and inorganic acids and their salts, and the more active animal and vegetable poisons.

Examination of the Urine.

624. For this purpose the medical man must resort to chemical tests and to the microscope. Our tests have sometimes to be applied to the

urine as it is passed ; in other instances the urine being allowed to remain at rest for some time, we examine in turn the clear supernatant portion and the deposit. The microscope is generally used to identify the deposited matters, or those thrown down by chemical reagents.

625. *Tests.*—The tests in most common use are turmeric and litmus paper, heat, and nitric acid. Hydrochloric and acetic acids, liquor ammoniæ, and liquor potassæ are also frequently employed ; and, for certain purposes, alcohol and solutions of oxalate of ammonia, of sulphate of copper, and of oxalic acid are required. A spirit-lamp, and fragment of platinum foil, and an urinometer, or 1,000 grain bottle, complete the list of materials commonly required for the chemical examination of the urine.

626. The apparatus required for microscopic examination consists of a few conical glasses (wine-glasses with narrow stems will answer the purpose) for collecting deposits, and a pipette. The deposits are allowed to collect for several hours in the bottom of the glass, are then drawn off by the pipette, and transferred to a glass cell ; or a drop of the urine is placed on a glass slide, and protected by a fragment of thin glass.

627. The urine submitted to examination should be either an average specimen of the entire day, or that voided on first rising in the morning.

628. Great care should be taken to avoid the introduction of extraneous matters into the urine. That reserved for examination should be protected by a cover. The extraneous substances likely to be found in the urine are depicted in Dr. Beale's "Use of the Microscope in Clinical Medicine illustrated."

629. In order to present a complete view of this subject, the principal indications of the tests will first be described, and then the chemical and microscopical properties of the several constituents of the urine.

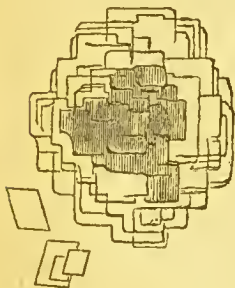
Turmeric paper is changed from yellow to brown, when the urine is alkaline ; blue *litmus paper* to red when the urine is acid. *Heat* throws down albumen, and also the phosphates when they are in excess, but it dissolves the urates of soda and ammonia. *Nitric acid.*—This acid throws down a dead-white precipitate of albumen ; it precipitates uric acid after the lapse of some hours, and dissolves it with effervescence ; it also dissolves the oxalate of lime and the alkaline and earthy phosphates ; it precipitates the colouring matter of bile of a green colour, but if added in excess, it changes it quickly to a dingy red, and afterwards to a brown ; it also detects urea in excess, when added to an equal quantity of urine, by the formation of crystals of nitrate of urea. Moreover, it produces a cloudiness in urine containing certain essential oils. *Hydrochloric acid* precipitates uric and hippuric acid, and it throws down the colouring matter of the bile of a green colour, whatever quantity may be added. It also dissolves the oxalate of lime, cystine, and the phosphates. *Acetic acid* produces a cloudiness in urine containing mucus ; it dissolves the alkaline phosphates, and

the phosphate of lime sparingly. *Sulphuric acid*, added to warm urine containing sugar or albumen, causes a deposit of carbon. *Caustic ammonia* throws down the earthy phosphates as a white precipitate, and dissolves cystine; its vapour imparts a rich purple hue to the crystals of uric acid. *Oxalic acid in solution* throws down a characteristic oxalate of urea. *Oxalate of ammonia* is used to detect the presence of the phosphate of lime. *Caustic potash* dissolves uric acid and the urates of soda and ammonia. With the aid of heat it disengages ammonia from the urate of ammonia; it also changes saccharine urine to a dark-brown colour, and thickens purulent deposits. A solution of *sulphate of copper*, previously rendered strongly alkaline by caustic potash, when heated with saccharine urine, detects the presence of sugar by causing a deposit of the red oxide of copper. *Alcohol*, by the aid of heat, dissolves cholesterine and hippuric acid.

The following are the chemical and microscopic characters of the principal constituents of the urine in health and disease.

630. *Urea*.—This principle in excess gives a high specific gravity to the urine (1·030—1·035). If abundant, it may be detected by adding to a small quantity of urine in a watch-glass an equal bulk of strong nitric acid. If kept in a cool place, crystals of nitrate of urea are formed. If, however, the quantity of urea is small, we must evaporate before applying the nitric acid.

Fig. 10.

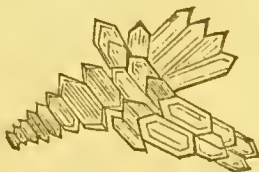


The best process for detecting urea and obtaining well-formed crystals of nitrate of urea is the following: Evaporate a portion of urine in a water-bath to the consistence of a syrup; add strong alcohol, filter the alcoholic

solution, and evaporate it in the water-bath nearly to dryness; add a few drops of water and of strong nitric acid. Crystals of nitrate of urea are speedily formed, which assume, under the microscope, the form depicted in fig. 10. For practical purposes the presence of urea may be readily detected by evaporating a few drops of urine on a fragment of glass, and adding an equal quantity of nitric acid.

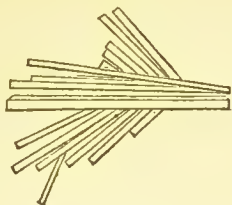
If we substitute oxalic acid for nitric acid, we obtain crystals of the microscopic form annexed:—

Fig. 11.



The alcoholic extract of urea leaves, on spontaneous evaporation, acicular crystals of the following form:—

Fig. 12.



631. *Uric Acid*.—Uric or lithic acid sometimes exists in the urine in such quantity as to separate from it, on cooling, in the form of a crystalline deposit. It is occasionally voided as gravel; but it is a frequent constituent of urinary calculi. Uric acid, as existing in urinary deposits, has every tint from light yellow to deep orange-red, or dark brown; and occasionally it is quite free from colour. Hence the familiar names of “yellow and red sand.”

Urine which yields uric-acid deposits has generally a higher colour than natural, an acid reaction, and a specific gravity of 1·020 or more. Uric acid may be separated from urine which yields no deposit on cooling, by adding hydrochloric acid in the proportion of two or three drachms to six or eight ounces of urine. The mixture, on being allowed to stand in a covered vessel for twenty-four to forty-eight hours, yields a red or reddish-brown sediment of uric acid.

The crystals also vary in size from grains visible to the naked eye, and known as *Cayenne pepper grains*, to a fine granular deposit, in which the characteristic forms of the crystal are only to be detected under high powers of the microscope.

632. Uric acid has the following chemical characters. It is insoluble in hot and cold water; it is not redissolved when the urine is heated; it is very soluble in caustic potash, and precipitated granular and colourless from this menstruum by the addition of an acid in excess; it is dissolved by nitric acid with effervescence, and on evaporation to dryness yields a red or pink residue, which is changed to a rich purple (murexide) when exposed to the vapour of ammonia. Heated on platinum-foil uric acid burns, giving out an odour of bitter almonds, and leaving a scanty white ash.

Fig. 13.



633. Under the microscope uric acid displays a great variety of

forms. The proper shape of the crystal is rhomboidal; but it may assume one or other of the annexed forms, some of which are of comparatively rare occurrence. (One of the figures represents the uric acid crystallized on a hair.)

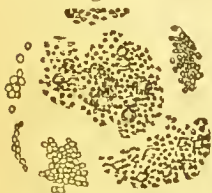
634. *Hippuric Acid*.—This, which is an abundant constituent of the urine of herbivorous animals, also exists in human urine. It may be obtained by evaporating a few ounces of urine to the consistence of a syrup, and adding hydrochloric acid in excess. A mixture of uric and hippuric acids is thrown down. This deposit, having been washed in cold water, is to be boiled with alcohol. The hippuric acid will be dissolved, and, on evaporating the spirituous solution, is deposited in the form represented in the annexed engraving.

Fig. 14.



635. The *Urates* or *Lithates*.—These deposits are often found in the urine in considerable quantity, generally falling as the urine cools, but occasionally they are voided with the urine. They are rarely free from colour, and may assume any tint from light yellow to dark brown. Sometimes they are quite white, sometimes bright red. They are soluble in warm water or in warm urine, and in alkalies. Acids in excess throw down crystals of uric acid, which, when treated first with nitric acid and then with ammonia, yield the rich purple murexide.

Fig. 15.



out ammonia, when

636. *Urate of Ammonia*.—This salt is sometimes found diffused through the urine, so as to give it the ropy appearance of muco-pus; in other cases it forms a whitish deposit; in others, again, a reddish-brown deposit, known as the *lateritious* or *brick-dust* sediment.

Urate of ammonia shares with the other urates the properties enumerated in § 635; but it possesses the characteristic property of giving out ammonia, when heated with liquor potassæ. Under the microscope, it has the appearance depicted in Fig. 15. The granular deposit known as urate of ammonia often consists of the mixed urates of soda, ammonia, lime, and magnesia.

Fig. 16.



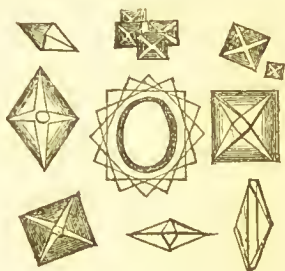
treated with carbonate of soda.

637. *Urate of Soda*—Is comparatively rare as an unmixed deposit, but it is sometimes met with in gout, and in fever patients

Urate of soda has the chemical properties common to the urates. It tinges the outer flame of the blowpipe yellow. Under the microscope it presents the characteristic form seen at *a*, Fig. 16; *b* displays a rare variety, depicted by Dr. Beale.

638. *Oxalate of Lime*.—This is rarely seen as a granular deposit, but is frequently diffused through the urine as minute octahedral crystals, visible under the microscope. It is a common constituent of urinary calculi, and the material of the so-called mulberry calculus. It may be recognised by its insolubility in water, liquor potassæ, and acetic acid; but it is soluble in nitric acid, and is converted at a red heat into *carbonate of lime*, which is identified by dissolving with effervescence in acids.

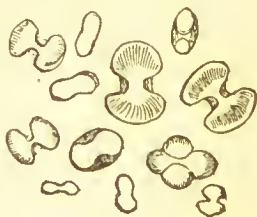
Fig. 17.



639. Oxalate of lime may be obtained for chemical or microscopic examination in the following manner. One or two ounces of the urine are allowed to stand for a few hours in a conical wine-glass with a thin stem. A portion of the lower stratum is then withdrawn by the pipette, placed in a watch-glass, and gently heated. Crystals of the oxalate of lime are deposited, which may be collected at the bottom of the glass by carefully rotating the fluid. After allowing it to remain at rest for a few minutes, the fluid portion may be withdrawn by the pipette, its place being supplied by distilled water. The white glistening powder, again collected in the centre of the glass by gently rotating it, may be transferred by the aid of the pipette to the field of the microscope.

640. The crystals of oxalate of lime so obtained generally appear under the microscope as flattened octahedra, with one short axis and two larger ones, fig. 17; but they may also assume the form known as the *dumb-bell crystal*. Crystals of this shape are believed to be generally, if not always, formed in the kidney itself, and they differ from the octahedra in one or two particulars. They polarise light, and are perceptibly acted upon by acetic acid, which destroys their polarising power. The dumb-bell, in its more or less perfect form, is depicted in the annexed engraving. Both the octahedra and the dumb-bells are found adhering to casts of the urinary tubes. Octahedra so adhering are shown in fig. 33.

Fig. 18.



641. *The Phosphates*.—Phosphoric acid exists in urine in combination with alkaline and earthy bases, as,

1. The ammonio-phosphate of magnesia, or the triple phosphate.
2. The ammonio-phosphate of magnesia, with excess of ammonia, known as the basic or bibasic phosphate.
3. Phosphate of lime.

These deposits have the following properties in common. They generally occur in neutral or slightly-alkaline urine; are white unless tinged with blood; are not dissolved by heating the urine which contains them, but are, on the contrary, thrown down by heat; they are soluble in weak acids, but insoluble in water, in ammonia, and in liquor potassæ. The phosphate of lime is less soluble in acids. Heated separately they fuse with great difficulty; but when combined in nearly equal proportions, the phosphate of lime and the triple phosphate fuse readily, constituting the fusible calculus.

642. 1. *The ammonio-magnesian phosphate, or triple phosphate.*—On adding a few drops of ammonia to healthy urine, the urine becomes turbid, and deposits the triple salt in combination with phosphate of lime. The same result may happen from the development of ammonia or its carbonate when the urine is retained in the bladder for a long time, as in cases of paraplegia, or allowed to stand some hours out of the body. It is also of common occurrence in diseased states of the mucous membrane of the bladder. The triple phosphate may present itself in any of the following forms:—*a.* As a white

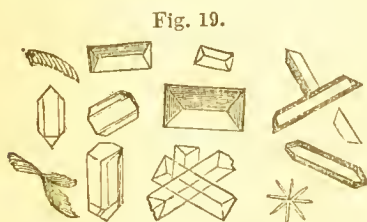


Fig. 19.

crystalline gravel. *b.* As a thin iridescent film on the surface of the urine. *c.* As a dense white deposit closely resembling mucus. *d.* In masses or ropes resembling puriform mucus. Under the microscope the triple phosphate presents itself in some of the annexed forms. It is very commonly seen as triangular or four-sided prisms with truncated ends. (Fig. 19.)

643. 2. *The basic or bibasic phosphate* (the triple phosphate, with excess of ammonia) has the microscopic characters shown in the annexed engraving. (Fig. 20.)

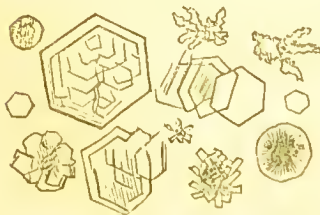
Fig. 20.



3. *The phosphate of lime* occurs as an amorphous deposit, or in little rounded particles, usually found adhering to the crystals of the triple phosphate.

644. *Cystine.*—This curious substance is characterised by the great excess of sulphur that enters into its composition. It is not a constituent of healthy urine, and is a rare product of disease. It constitutes a form of urinary calculus, but very seldom exists as a deposit. The urine which contains cystine is usually of a pale-yellow colour, of low specific gravity, and of an odour resembling sweet-briar. The deposit of cystine is

Fig. 21.



white, or of a pale-fawn colour, distinguished from white urate of

ammonia by not disappearing on the application of heat to the urine which contains it, and from the earthy phosphates by its insolubility in dilute hydrochloric or strong acetic acid. It is at once distinguished from all other deposits by its ready solubility in ammonia. The form of the crystals is that of hexagonal plates of variable thickness, but generally thin, and often found superimposed, as in Fig. 21. The ammoniacal solution yields, on evaporation, the same well-formed hexagonal plates or prisms, but sometimes the clustered crystals figured in the engraving. Cystine is often found blebbed with uric acid and the urates.

645. *Chloride of Sodium*.—Common salt sometimes forms a crystalline deposit on the evaporation of the urine. The proper form of the crystals is the cube. On hasty evaporation, they wear the irregular cruciform appearance depicted in Fig. 22. Sometimes, as in the figure, they are octahedra.

Fig. 22.



646. *Chyle*.—The term chylous urine is applied to urine which, on cooling, gelatinises spontaneously, assuming the appearance and consistence of *blanc-mange*. It contains large quantities of albumen and fat, and is identified by its spontaneous coagulation.

647. *Fat*.—Urine may contain fat as a separate element, or as a constituent of chyle or milk. It is also frequently met with in the shape of oil-globules attached to epithelial cells, or casts of tubes. (See § 408, Fig. 8 b, and § 664, Fig. 31.) The quantity of fat may be ascertained by evaporating a measured portion of the urine, dissolving the deposit in ether, evaporating the ethereal solution, and weighing the residue.

648. *Milk*.—Urine containing milk is turbid, of a pale colour, and contains fat globules and colostrum corpuscles, which may be seen under the microscope. Milky urine does not coagulate by heat, unless the quantity of lactic acid be considerable, or unless it also contain albumen. On adding to a small quantity of the urine moderately warmed a few drops of acetic, dilute sulphuric, or hydrochloric acid, flocculi of coagulated caseine are formed. The quantity of caseine may be determined by collecting these flocculi, washing and drying them, and then dissolving out the oil-globules by æther.

649. *Sugar*.—This may sometimes be detected by the taste, especially if we first evaporate the urine to the consistence of a syrup; but this test is inconvenient in practice, and not to be depended on.

The specific gravity of the urine affords certain evidence of the existence of sugar only when it exceeds 1.035, which is probably the highest specific gravity of urine containing urea in excess. The specific gravity of diabetic urine ranges from 1.020 to 1.050. When the symptoms lead to a suspicion of the presence of sugar, its presence may be detected by one or more of the following tests :—

(1.) *Trommer's Test*.—Add enough solution of sulphate of copper to give the urine a faint blue tint; then add liquor potassæ in excess. A precipitate of hydrated oxide of copper is formed, which dissolves in the excess of alkali. On boiling the liquid, the red suboxide of copper, varying in colour from light orange to deep crimson, is thrown down if sugar be present.

(2.) *Fehling's Test solution*.—This may be conveniently substituted for the sulphate of copper and caustic potass used in Trommer's test. The solution is prepared by dissolving 69 grains of sulphate of copper in five times its weight of distilled water, and adding a concentrated solution of 268 grains of tartrate of potash, and then a solution of 80 grains of caustic soda in one ounce of distilled water.

The following tests have been recommended, but are less free from objection than the foregoing:—

(3.) *Moore's Test*, with *liquor potassæ*.—Pour a small quantity of the urine supposed to contain sugar into a test-tube, add to it about half its bulk of liquor potassæ, and boil for one or two minutes by the heat of a spirit-lamp. The urine will assume an orange-brown tint of a depth proportioned to the quantity of sugar.

(4.) *Runge's Test*, with *dilute sulphuric acid*.—Evaporate a small quantity of the urine on a surface of white porcelain, add to the warm liquid a few drops of dilute sulphuric acid (one part of the acid to six of water). If sugar be present the spot becomes deep brown or black, from the deposition of carbon. This is a delicate test, but not conclusive, as albumen will yield a similar result.

(5.) *Capezzuoli's Test*, with *hydrated oxide of copper* and *liquor potassæ*.—Drop into the urine a few grains of the blue hydrated oxide of copper, and then add a small quantity of liquor potassæ, so as to render the liquid alkaline. If sugar be present the fluid becomes of a reddish colour, and in a few hours the fragments of the oxide become yellow, first at the edges, and then through the whole mass: this arises from the reduction of the oxide to the form of suboxide.

(6.) *Horsley's Test*, with *chromate of potass*.—Add to the urine an alkaline solution of chromate of potass, and boil. The liquid will assume a deep sap-green colour, due to the reduction of the oxide of chromium. The alkaline solution to consist of neutral chromate of potass and liquor potassæ in equal proportions.

(7.) *Crystallization Test*.—Evaporate the urine to the consistence of a thick syrup, and digest the residue in hot alcohol. Pour the cooled alcoholic solution into a large test-tube, and allow it to evaporate spontaneously. The sugar will crystallize on the sides of the glass in white granules.

(8.) *Fermentation Test*.—On adding yeast to diabetic urine, and raising the temperature to 80°, effervescence takes place, a brisk discharge of gas ensues, and a yellowish liquid is formed, which has the odour of beer, and yields an alcoholic liquid by distillation. One part of sugar in 1,000 parts of healthy urine of the density 1,030 may be

detected by this means. The test was first suggested for animal fluids by Gmelin, and for urine by Dr. Christison.

Fig. 23.

(9.) *Torula Test*.—Expose the urine for a few hours to a temperature above 70° . A drop of the urine taken from the scum which covers the surface, and placed under the microscope, exhibits oval vesicles, which rapidly grow into a species of con-ferva, to which the term *torula* has been given. This formation, however, is not peculiar to diabetic urine. (Fig. 23.)



650. The quantity of sugar may be determined with a fair approach to accuracy by the Fermentation test. "Every cubic inch of carbonic acid gas given off by fermentation, corresponds in round numbers with one grain of sugar, or forty-seven of gas to forty-five of sugar. Hence the quantity of sugar may be easily found by filling a graduated tube with mercury, leaving space for a little more than the requisite quantity of urine, which is then to be introduced; next filling up what remains of the space with yeast, and with the finger on the open end of the tube, reversing the tube in a vessel of mercury, and then placing the apparatus where it may be exposed to a heat of 70° or 80° for twelve or twenty-four hours." (Christison.) Since the fluid thus introduced dissolves its own bulk of carbonic acid, the measure of the fermented liquid will equal that of the fluid and disengaged gas together.

651. *Bile*.—Urine containing bile is of a deep yellow-brown colour, and if the quantity be considerable, of a bitter taste. The bile may be detected by any of the following tests:—

(1.) *Nitric Acid Test*.—Place a few drops of the urine on a white surface of porcelain, and add a drop of nitric acid. If bile be present, green and pink colours will show themselves round the test.

(2.) *Pettinkoffer's Test, Sulphuric Acid and Sugar*.—Place a few drops of the urine on a white surface of porcelain, and add a drop or two of strong sulphuric acid. While the mixture is hot add a drop of strong syrup. If bile be present a fine purple colour will be produced.

(3.) A third test has been proposed by Schwertfeger. It consists in throwing down the bile as a yellow precipitate, by acetate of lead, and dissolving the precipitate in alcohol acidulated with sulphuric acid. To the green solution thus obtained, Pettinkoffer's test may be applied.

Tests 1 and 2 are most expeditious, and, therefore, to be preferred.

652. *Kyestein*.—This, though not peculiar to pregnant women, is found in most cases of pregnancy. It consists of a film of fat, a peculiar matter resembling caseine, and crystals of ammoniaco-magnesian phosphate. It forms upon the surface of the urine in periods varying from thirty hours to eight days, but most frequently on the third day. The urine is either neutral or ammoniacal at the time of its formation. After standing some time the pellicle breaks up and falls to the

bottom of the vessel. The sediment has a disagreeable pungent odour of decayed cheese.

653. *Blood*.—Blood is sometimes voided with the urine in small defined clots, which are readily recognised; but, in other cases, it tinges the urine of a bright red, brown, or bistre-red colour. The colour alone is not conclusive, as other colouring matters produce similar appearances. The nature of the colouring matter is, however, easily ascertained, either by the discovery of blood corpuscles under the microscope, or by the effect of heat and nitric acid, which throw down a dirty-brown coagulum, consisting of albumen blended with the colouring matter. The urine also becomes of a bright-red colour when treated with a concentrated solution of common salt.

Fig. 24.



654. *Blood Corpuscles*.—When not dissolved in the urine, the blood corpuscles form a dark brown-red sediment, in which their forms (see annexed engraving) may be discovered by the microscope.

655. *Fibrine*.—This substance is voided in the form of casts of the tubes, or as a constituent of clots of blood. Coagula and flocculi of fibrine are readily distinguished from mucus by their amorphous appearance under the microscope, and the absence of epithelial scales.

656. *Albumen*.—Tests—heat, and nitric acid. These should always be employed at the same time. For heat will throw down the phosphates if they be in excess, and the acid may render the urine turbid if it contain any essential oil, as that of cubebs or copaiba. Should the phosphates in excess coexist with an essential oil, both heat and nitric acid would throw down a white precipitate. The addition of an acid will dissolve the phosphates; the essential oil may be separated by æther, after which the urine will have its usual reaction. Corrosive sublimate in solution is also a delicate test for albumen, but the two tests just mentioned are those commonly employed.

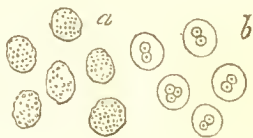
657. *Mucus*.—A small quantity of mucus is present in healthy urine, but does not affect its transparency. In disease it may be blended with it in any proportion, from a slight cloud to a quantity sufficient to cause it to pour from one vessel to another as a viscid ropy fluid; and when the quantity of mucus is considerable, and the result of acute inflammation of the mucous membrane of the bladder, and especially when it is blended with an excess of phosphates, it may form a distinct deposit closely resembling pus. Urine containing mucus has generally an alkaline reaction, and is not coagulated by heat or nitric acid, unless albumen be also present. Acetic acid coagulates it.

658. *Pus*.—Urine containing pus is commonly either acid or neutral; and, on standing, deposits the pus as a distinct cream-coloured layer, which may be readily diffused through the fluid by agitation. The deposit is not dissolved by acetic acid; it is rendered viscid and more consistent by liquor potassæ, and when shaken with æther, yields a

quantity of fat. The urine, freed from its purulent deposit, is coagulated by heat and nitric acid. In alkaline urine, pus assumes something of the viscosity of mucus.

Under the microscope pus presents a number of opaque spherical bodies, consisting of a cell-membrane enclosing nuclei, oil-globules, and minute granules. The addition of acetic acid renders the envelope transparent and the nuclei more distinct, as in the subjoined engraving (Fig. 25), in which *a* represents the ordinary appearance of the pus granule, and *b* of the same granule on the addition of acetic acid. Mucus presents similar microscopic appearances, but the particles are not so distinctly granular.

Fig. 25.



659. *Diagnosis of Pus and Mucus*.—Much stress was formerly laid on the importance of distinguishing between pus and mucus, and many methods were devised for effecting that object. But it is now well understood that though there is a great difference between pus and healthy mucus there is very little difference between pus and mucus thrown out by an inflamed membrane. The only satisfactory means of distinction is the application of heat or nitric acid to the urine containing the pus or mucus respectively. Urine containing pus is coagulated by these reagents, while urine containing mucus is not, unless it also contain albumen derived from some other source.

660. *Semen*.—Occasionally the seminal fluid which lines the urethra after emission becomes washed away by the urine, and may be recognised in it by the peculiar appearance of the spermatozoa. (Fig. 26.) The examination should be made soon after the urine is passed; a quarter or an eighth power should be used, and the object should not be too strongly illuminated.

Fig. 26.



661. *Epithelium*.—The epithelium scales which are found blended with pus and mucus, and are often discharged in large quantities, especially by persons suffering from the secretion of oxalate of lime, are easily recognised by their well-known microscopic characters. (Fig. 27.)

Fig. 27.



662. It is sometimes important to be able to form an opinion on the spot, by inspection and the use of one or two simple tests, as to the character and composition of an urinary deposit. The deposits which we are most likely to encounter may be classed as follows:—

- (1.) Red crystalline sediment—Urine acid. Urine acid with colouring matter of the urine.
- (2.) White crystalline sediment—Urine neutral or alkaline. Triple or ammoniaco-magnesian phosphate.

(3.) White amorphous sediment—Triple phosphate, and phosphate of lime.

(4.) Pink sediments—Urine acid. Urate and phosphate of ammonia.

(5.) Yellowish or nut-brown sediment—Urate of ammonia and soda, earthy phosphates, and colouring matter of urine.

(6.) Reddish-brown or lateritious sediment—Alkaline urate (chiefly urate of soda), earthy phosphates (occasionally), colouring matter of urine, and alkaline purpurate.

(7.) Oxalate of lime. Rare as a deposit.

(8.) Carbonate of lime } Very rare.

(9.) Cystic oxide }

(10.) Red particles of blood, pus, mucus, &c.

663. The substances contained in 2, 3, 4, 5, and 6, consist of a mixture of colouring matter with alkaline urates and the earthy phosphates in variable proportions. These are easily distinguished, both from each other and from certain secretions which may resemble them, by shaking the sediment up in the urine, and applying heat to the turbid fluid. If the sediment dissolve, it consists of the alkaline urates, and chiefly of urate of ammonia; if, on the other hand, the fluid remain turbid, the deposit consists of the earthy phosphates, or of pus or mucus. These may be readily distinguished by the addition of hydrochloric acid, which dissolves the phosphates, but not the pus or mucus. If urine containing urates also holds albumen in solution, the urine when heated first becomes clear, and then turbid.

664. *Casts of the Urinary Tubes.*—In diseases of the kidney considerable importance attaches to a microscopic examination of the urine, with a view especially to the discovery of casts of the urinary tubes.

Diseases of the kidney which have not a local origin, such as blows on the loins, the irritation of a calculus, or retention of urine from stricture, are the result of an effort made by the kidney to separate

Fig. 28.



from the blood some morbid material, such as the poison of scarlatina, measles, erysipelas, or typhus; of gout, rheumatism, or serofula. Imperfect nutrition consequent on an insufficient supply of animal food, or an imperfect action of the skin or liver, may also excite disease in the secretory structure of the kidney; and lastly, a temporary disease of the kidney may be produced by irritant substances, such as oil of turpentine or cantharides. In all these cases the morbid products are thrown into the tubes of the kidney, and being dislodged by the urine flowing through them, appear in the secretion as cylindrical casts. As each form of kidney disease is attended by its characteristic cast, a careful examination of these bodies is essential to the formation of an exact diagnosis. The casts of which the chief varieties are represented in the figures, are best seen with a power magnifying about 200 diameters.

Fig. 28. An *epithelial cast*, composed of fibrine, entangling epithelium and blood corpuscles, and indicating the existence of "acute desquamative nephritis," a form of disease which occurs not uncommonly as a consequence of scarlatina, and which is analogous to the desquamation of epidermis from the skin.

Fig. 29.

Fig. 29.—A *granular cast*. Such casts are composed of fibrine, with particles of disintegrated epithelium, characteristic of "chronic desquamative nephritis." They commonly exist in the urine of those who have had numerous attacks of gout, and they may often be detected long before any other sign of renal disease. Albumen appears at a later stage.



Fig. 30.

Fig. 30 represents a peculiar form of cast which from its appearance may be called *waxy*. This material is sometimes deposited in the tubes in the advanced stage of chronic nephritis, but it sometimes occurs in an acute form as a primary disease of the kidney.



Fig. 31.

Fig. 31 represents casts composed of fibrine, entangling oil-globules and epithelial cells gorged with oil. They may be called *oily casts*, and they indicate the existence of fatty degeneration of the kidney, the most serious and incurable form of Bright's disease.

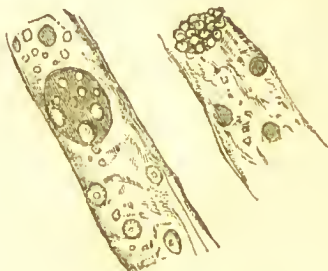


Fig. 32.

Fig. 32 represents *purulent casts*, that is to say, casts of fibrine entangling pus cells, from the urine of a man who had suppurative nephritis; a very serious and often fatally rapid form of disease.

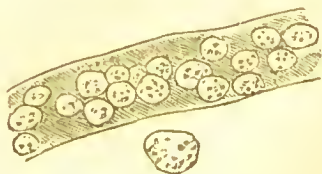
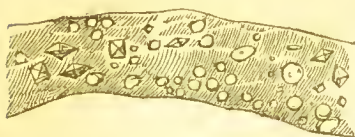


Fig. 33.—*Blood casts*, from the urine of a man who had strangury and hæmaturia, after taking oil of turpentine. The blood having been moulded in the kidney tubes, affords unequivocal evidence that the hæmorrhage was renal. The crystals attached to the cast are oxalate of lime. (The wood-cuts are from the drawings of Dr. George Johnson.)

Fig. 33.



665. In cases of diabetes, and in other morbid states in which the urine is loaded with matter in excess or foreign to its normal composition, it is desirable to be able to estimate the quantity of solid matter which the urine contains. This may be done by multiplying the excess of the specific gravity of the urine above that of water by the weight of the urine, and the product by 0·00233. If the weight of given quantities of urine of different specific gravities be known, the amount of solids may be directly calculated from the measured quantity, and in this way we may determine the solid matter passed in twenty-four hours, provided the urine submitted to examination be an average of that passed during the entire period. To obviate the necessity for calculation, two tables are given, of which the first presents the quantity of solid matter contained in 1000 grains of urine of different densities; and the second the weight of one pint of urine. The mode of using the tables will be readily seen from a single example. Suppose a patient to pass, in twenty-four hours, three pints of urine of the specific gravity of 1·030, it is required to ascertain the weight of solid matter voided in this period. 1000 grains of urine, specific gravity 1·030, contain by Table I. 69·9 grains of solid matter, and a pint of urine of the same specific gravity weighs, by Table II., 9012 grains. Hence $\frac{69\cdot9 \times 9012}{1000}$ or 629·9 grains is the quantity of solid matter contained in each pint of urine; and $629\cdot9 \times 3$, or 1889·7 grains, is the total weight of solids voided in the twenty-four hours. This calculation gives a sufficiently close approximation to the actual weight of saccharine matter in cases of diabetes mellitus.

TABLE I.

Solids in 1000 Grains of Urine of different densities.

Specific Gravity.	Solids.	Specific Gravity.	Solids.
1·001 -	2·33	1·010 -	23·30
1·002 -	4·66	1·011 -	25·63
1·003 -	6·99	1·012 -	27·96
1·004 -	9·32	1·013 -	30·29
1·005 -	11·65	1·014 -	32·62
1·006 -	13·98	1·015 -	34·95
1·007 -	16·31	1·016 -	37·28
1·008 -	18·64	1·017 -	39·61
1·009 -	20·97	1·018 -	41·94

Specific Gravity.	Solids.	Specific Gravity.	Solids.
1.019 -	44.27	1.035 -	81.55
1.020 -	46.60	1.036 -	83.88
1.021 -	48.93	1.037 -	86.21
1.022 -	51.26	1.038 -	88.54
1.023 -	53.59	1.039 -	90.87
1.024 -	55.92	1.040 -	93.20
1.025 -	58.25	1.041 -	95.53
1.026 -	60.58	1.042 -	97.86
1.027 -	62.91	1.043 -	100.19
1.028 -	65.24	1.044 -	102.52
1.029 -	67.57	1.045 -	104.85
1.030 -	69.90	1.046 -	107.18
1.031 -	72.23	1.047 -	109.51
1.032 -	74.56	1.048 -	111.84
1.033 -	76.89	1.049 -	114.17
1.034 -	79.22	1.050 -	116.50

TABLE II.

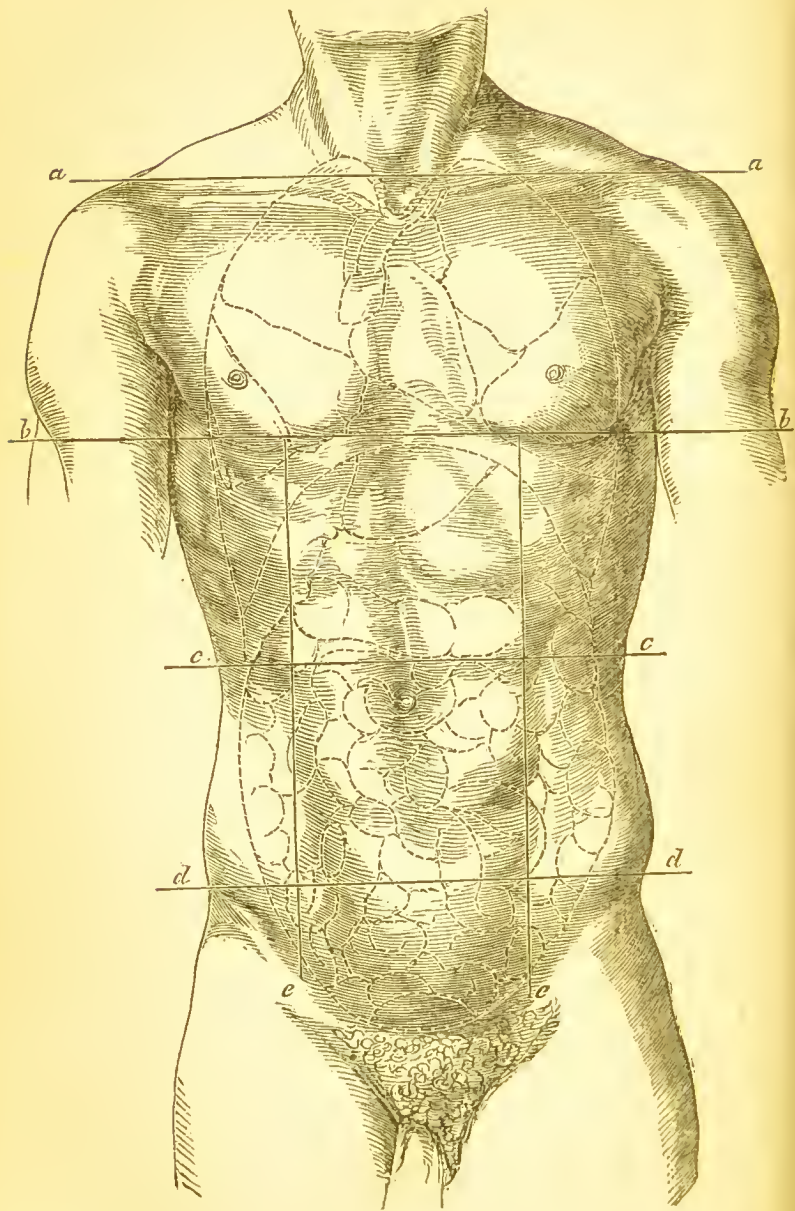
Weight of a Pint of Urine of different densities.

Specific Gravity.	Weight of one Pint.	Specific Gravity.	Weight of one Pint.
1.010 -	8837	1.031 -	9021
1.011 -	8846	1.032 -	9030
1.012 -	8855	1.033 -	9038
1.013 -	8863	1.034 -	9047
1.014 -	8872	1.035 -	9056
1.015 -	8881	1.036 -	9064
1.016 -	8890	1.037 -	9073
1.017 -	8898	1.038 -	9082
1.018 -	8907	1.039 -	9091
1.019 -	8916	1.040 -	9099
1.020 -	8925	1.041 -	9108
1.021 -	8933	1.042 -	9117
1.022 -	8942	1.043 -	9126
1.023 -	8951	1.044 -	9134
1.024 -	8960	1.045 -	9143
1.025 -	8968	1.046 -	9152
1.026 -	8977	1.047 -	9160
1.027 -	8986	1.048 -	9169
1.028 -	8995	1.049 -	9178
1.029 -	9003	1.050 -	9187
1.030 -	9012		

2. THE ABDOMEN AND ORGANS OF DIGESTION.

666. *The Abdomen.*—To facilitate description, the chest and abdomen are divided into a number of distinct parts or regions by imaginary lines drawn from fixed points. (See figures, pp. 154, 156.)

Fig. 34.



This division is made, in the first place, by four horizontal lines passing round the trunk of the body—the first (*a a*) at the level of the clavicles, the second (*b b*) at the level of the point of the ensiform cartilage, the third (*c c*) at the level of the cartilages of the tenth ribs, and the fourth (*d d*) at the highest points of the crests of the ilia. The abdomen is further subdivided into seven regions (three central and four lateral) by two vertical lines (*e e*) springing from the middle point of each groin, and meeting the horizontal line (*b b*).

The three central regions thus formed are named in the order from above to below, the epigastric, the umbilical, and the hypogastric; the four lateral regions, taken in the same order, are the right and left hypochondriac, and the right and left iliac. The portion of the abdomen immediately above the line of Poupart's ligament is commonly known as the inguinal region.

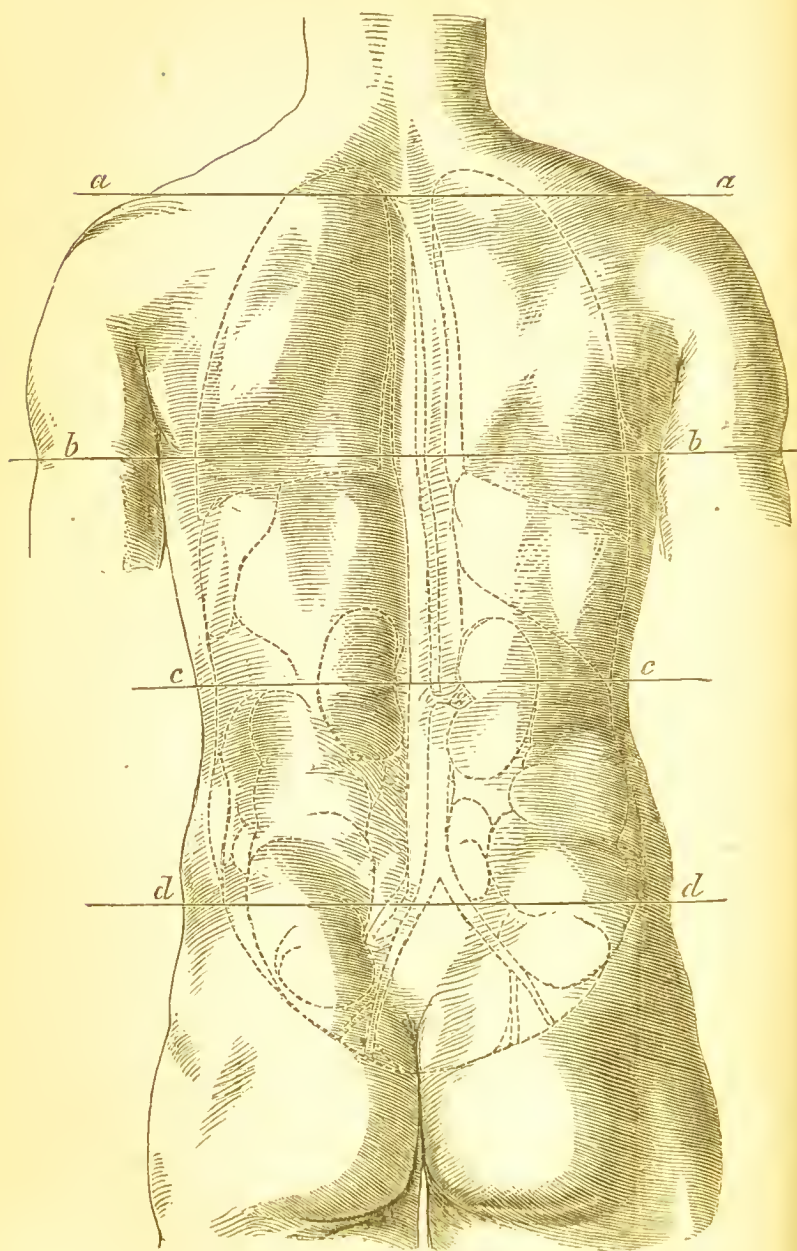
667. The organs situate in each of these regions are as follow:—The *epigastric* contains the middle portion of the stomach with its pyloric extremity, the left lobe of the liver, the lobulus spigelii and hepatic vessels, and the head of the pancreas; and behind these, the cœliac axis, the semilunar ganglion, and part of the vena cava, aorta, vena azygos, and thoracic duct. The *umbilical* contains the omentum and mesentery, the transverse portions of the duodenum and colon, and some convolutions of the jejunum. The *hypogastric* is occupied by the bladder and a portion of the omentum and small intestines. Behind the bladder lies the uterus in the female, and the rectum in the male. The *right hypochondriac* region contains the right lobe of the liver and the gall-bladder, part of the duodenum and ascending colon, the renal capsules, and part of the right kidney; the *left* contains the large end of the stomach, the narrow extremity of the pancreas, the spleen, part of the colon, the renal capsules, and upper part of the left kidney. The *right iliac* region contains the cæcum, with the termination of the ileum and the commencement of the colon; the *left*, the sigmoid flexure and part of the descending colon.

668. The posterior regions, formed by continuing the horizontal lines *b b*, *c c*, and *d d*, are divided by a vertical line following the course of the spine into four regions, the right and left dorsal, and the right and left lumbar. The *right and left dorsal* regions contain the upper portions of the kidneys. The *right lumbar* contains the cæcum and lower portion of the right kidney; the *left*, the sigmoid flexure of the colon, and lower portion of the left kidney.

669. When any of the organs are distended or enlarged, they encroach upon surrounding parts, and occupy adjoining regions. Thus, the distended stomach or bladder may encroach on the umbilical region; the distended colon may rise into the epigastric; and the enlarged liver or spleen may descend into the right or left iliac.

670. The *size and shape* of the abdomen vary with age and sex. In the child the abdomen is large; in the spare adult, small; in the female it naturally presents an enlargement in the hypogastric region.

Fig. 35.



persons of sanguine and nervous temperaments it is small; in the phlegmatic, and in the melancholic, more commonly large. It varies in size, in the same person, with the full or empty state of the stomach, the quantity of gas in the intestines, and of urine in the bladder. Pregnancy, ascites, ovarian dropsy, tympanites, hydatids, enlargement of the liver or spleen, and various morbid growths attached to the several organs, may also greatly increase the size and alter the shape of the abdomen.

671. In examining the abdomen, we employ three methods—*inspection*, *manual examination*, and *percussion*. In certain cases we resort to measurement, and in a few instances to auscultation.

672. By *inspection*, we ascertain the size, form, and movements of the abdomen. The size is increased by any of the causes just specified; the form, too, is altered, either throughout the entire cavity, or in parts, according as the cause is extensive or limited. The history of changes of form is very important. Thus, the gradual, uniform, and central enlargement of pregnancy, the lateral enlargement in the first stage of ovarian dropsy, and the equal and gradual growth of ascites, form important means of diagnosis.

673. The movements of the abdominal parietes are not less important, especially those of respiration. Thus, in peritoneal inflammation, respiration is performed by the chest alone; and the same absence of motion in the abdomen is seen in severe rheumatic affections of its muscles. On the other hand, in pleuritis and in severe rheumatic affections of the muscles of the chest or of the diaphragm, the respiration is performed chiefly by the muscles of the abdomen. Again, when the abdomen is greatly distended from any cause, the action of the abdominal muscles is nearly suspended, and respiration is performed by the chest and diaphragm. When the distension is still greater, the viscera are pressed against the diaphragm, and respiration is performed solely by the muscles of the chest.

674. By the *touch*, we gain further information as to the size, form, shape, tension, and movements of the abdomen. This is the best mode of counting the respiration, when the patient is lying down. The pulsations of the aorta, when the seat of aneurism, are also detected by this means; but it must be borne in mind that the aorta sometimes communicates its pulsation to tumours situate over it, and even to accumulations of *fæces*. We also ascertain by the touch the temperature and degree of sensibility of the abdomen. The *temperature* should be compared with that of other parts of the body. In acute peritonitis, and in severe febrile affections accompanied with abdominal inflammation, the surface is very hot, and has a peculiar pungency.

675. In testing the *sensibility* of the abdomen, pressure should first be made gently, and with the open hand. If this gentle pressure gives pain, and inflammatory fever is present, the peritoneum is inflamed; but if there is no fever, the seat of the pain may be inferred to be the

muscular walls of the abdomen. If a slight touch produces no pain, we apply stronger pressure. If deep and moderately strong pressure occasions rather a feeling of soreness than of acute pain, we may conclude that inflammation of the mucous membrane of the stomach or intestines is present. But direct pressure of this kind sometimes produces very slight pain even when the peritoneum is inflamed; in such cases, a lateral pressure, causing the peritoncum to slide over the intestines, occasions extreme pain. In colica pictonum, strong pressure relieves pain, and forms an important means of diagnosis. Muscular pain, also, is relieved by gentle pressure, gradually increased; but, on the sudden removal of the pressure, the muscles are thrown into action, and acute suffering is produced. Pain may also occur from the sudden contraction of the muscles in the act of expiration. Hence the necessity of applying this diagnostic mark with some caution. Muscular pain, too, is rarely accompanied by much constitutional disturbance, and, like neuralgia of the skin, is often dependent on, or associated with, an irritable state of the spinal cord.

676. In applying pressure to the abdomen, we should always mark the expression of the countenance, as this is much more to be depended on than the answers of the patient, especially when typhous symptoms are present, or the brain is affected. When the abdomen is very tender, the patient is apt to throw the muscles into rigid tension, so as to shield the contents of the cavity from pressure. When the seat of the tenderness is the right hypochondriac region, and the cause disease of the liver, the right rectus muscle is generally found in a state of rigid contraction. When this muscular contraction exists, we watch for an opportunity of applying pressure when the patient's attention is diverted, or while he is speaking.

677. If in examining the abdomen we discover a tumour, or are anxious to ascertain the state of any of its contents more accurately, we relax the muscles of the abdomen, by placing the patient on the back, with the head slightly raised and bent forward, the arms extended by the sides, the thighs bent nearly at right angles on the trunk, the knees apart and turned outwards, and the feet resting on the bed in contact with each other. When so placed, the patient must be directed to use as little muscular effort as possible, and his attention must be diverted from the examination which is going on. In this relaxed state of the abdominal parietes, the position of tumours, and the extent of the enlargement which the viscera may have undergone, are readily ascertained.

678. *Percussion* may be performed either directly with the points of the fingers, or by the intervention of a plate of ivory or wood, or of a finger of the left hand. Applied in this latter manner over the site of the stomach, or over any portion of the small or large intestines containing air, percussion elicits a clear sound. In the epigastric region, in ordinary states of the stomach, and over any part of the intestines largely distended with air, the sound is tympanitic; the clear sound is

somewhat modified, if the air be mixed with fluid. Percussion, on the other hand, elicits a dull sound when applied over any of the solid viscera, over collections of fluid, over the hollow viscera when entirely free from air, over the intestines when containing only fæces, over the enlarged liver or spleen, and over solid tumours.

679. Percussion combined with the touch may be employed in detecting the presence of fluid. This is best done in the upright posture. It consists simply in placing the palm of the hand on one side of the abdomen with a firm but gentle pressure, and tapping sharply with the other hand on the part of the abdomen directly opposite to it. If fluid be present, a peculiar vibrating shock is experienced, which is not easily mistaken.

680. Direct percussion with the points of the fingers is useful in distinguishing muscular pains of the abdomen. A slight quick touch throws the muscles into action, and produces pain. This sign, combined with the absence of pain on firm pressure gradually applied, and the recurrence of the pain on the sudden removal of the pressure, together with the acute pain produced by every movement of the affected muscles, and the absence of urgent constitutional symptoms, distinguishes muscular pains from those due to disease of deep-seated parts.

681. *Measurement* of the abdomen is rarely resorted to. A common tape measure graduated to eighths of an inch will answer the purpose. No particular precautions are necessary; but in recording the result it may be well to state whether the measure was taken during inspiration or expiration. When the abdomen is uniformly enlarged by any tumour or collection of fluid, the measurement is best taken at the umbilicus.

682. *Ascultation* is occasionally resorted to in examining the abdomen, to confirm, by means of the friction-sound, the diagnosis of inflammation of the peritoneum. This sound is caused by the rubbing together of two peritoneal surfaces roughened by deposits of lymph. By the application of the stethoscope, we may also hear the pulsations of the aorta in spare persons. The stethoscope is also used by the accoucheur, with a view to detect the uterine murmur, and the pulsations of the foetal heart. The first is a blowing sound, synchronous with the pulse of the mother, and best heard in the iliac regions near the groins. The second is a double sound, not unlike the ticking of a watch, and occurring from 120 to 160 times in a minute. This sound, which is best heard about the centre of the left iliac region, is rarely audible till the end of the fifth month.

3. THE CHEST, AND THE ORGANS OF RESPIRATION AND CIRCULATION.

683. An examination of the external conformation of the chest must precede all inquiries into the diseases of the parts contained within it.

To facilitate such examination, the chest, like the abdomen, has been divided into regions, by lines drawn from fixed points. (See Figures, pp. 154 and 156.) The two horizontal lines (*aa* in the line of the clavicles, and *bb* on the level of the ensiform cartilage), joined by a vertical line bisecting the sternum, divide the chest anteriorly into two principal regions, of which certain parts are designated by characteristic names. The parts of the chest beneath the clavicles are known as the subclavian regions, and the parts of the neck above the clavicles as the supra-clavicular regions. The parts of the chest marked by the nipples are sometimes called the mammary regions, and the armpits are known as the axillary regions.

684. On the back part of the chest the scapular, intra-scapular, and infra-scapular, or superior dorsal regions, correspond—the first to the scapula of either side, the second to the space between the two scapulæ, and the third to that portion of the chest which is immediately below the angles of those bones.

685. The size, shape, and movements of the chest, may be ascertained by *inspection*, *manual examination*, and *measurement*.

686. *Inspection*.—A well-formed chest is large in all its dimensions, and round in its outlines. The spine is straight, or, in very strong men, and those who use the right arm much, curved almost imperceptibly towards the right side. The chest appears symmetrical; but when measured, the right side is found to be larger than the left by about half an inch; and there is naturally somewhat more fulness above and immediately beneath the clavicle on the left than on the right side, from the left lung rising higher than the right. The chest is wider and longer in men than in women; but deeper in women than in men. Women are also more subject to distortions of the chest and spine.

687. A glance at the chest enables us to judge of its size. A more minute examination is necessary to detect deviations from its accustomed form. The chief distortions affecting both sides of the chest alike, are those arising from the use of stays in the female, and from constrained posture in the male. Of the latter, the most remarkable is the flattened chest of the shoemaker. Alterations in the shape of both sides of the chest also arise from diseases affecting equally both lungs; such as tubercles, leading to contraction, especially in the subclavian region, and dilatation of the pulmonary cells (emphysema), causing a considerable enlargement chiefly about the middle of the chest. Alterations in the shape of one side only, or of a limited portion of one side, may arise from more than one disease of the corresponding lung. Pleurisy, both acute and chronic, causes an enlargement of the affected side, but in certain cases it gives rise to contraction. In hydrothorax, also, and in pneumothorax, the size of the affected side is increased. When the dilatation is extreme, the intercostal spaces are raised to a level with the ribs. More partial changes arise from circumscribed pleurisy and limited adhesions. In advanced cases of phthisis, the position of a

cavity is often indicated by the falling in of one of the intercostal spaces. Certain changes in the size and shape of the chest also arise from diseases of the heart and of the large vessels.

688. Inspection also enables us to ascertain the character of the respiration; whether tranquil or hurried, easy or difficult; whether abdominal, as in acute pleurisy or acute pleurodyne, or thoracic, as in acute diseases of the abdomen, and severe rheumatic affections of the abdominal muscles of the diaphragm. The character of the heart's impulse may also be ascertained by inspection of the chest.

689. *Manual Examination.*—By this, as by inspection, we ascertain the development of the muscles, the thickness of the parietes of the chest, the presence of obesity or emaciation, and of œdema or emphysema of the integuments. Heat and soreness of the skin, local tenderness, or muscular pain, may be ascertained by the same means. The extent and character of the heart's impulses may also be ascertained by the application of the hand, and it is usual to apply the two hands to corresponding parts of the chest when we wish to ascertain the comparative freedom of the respiration on the two sides.

690. The skin of the chest is preternaturally hot in inflammation of the lungs.

691. Firm pressure in the intercostal spaces often causes pain when the pleura is inflamed, either generally or partially. This partial tenderness occurs in consumption, when the pleura covering a cavity is inflamed, or when a collection of pus is making its way externally.

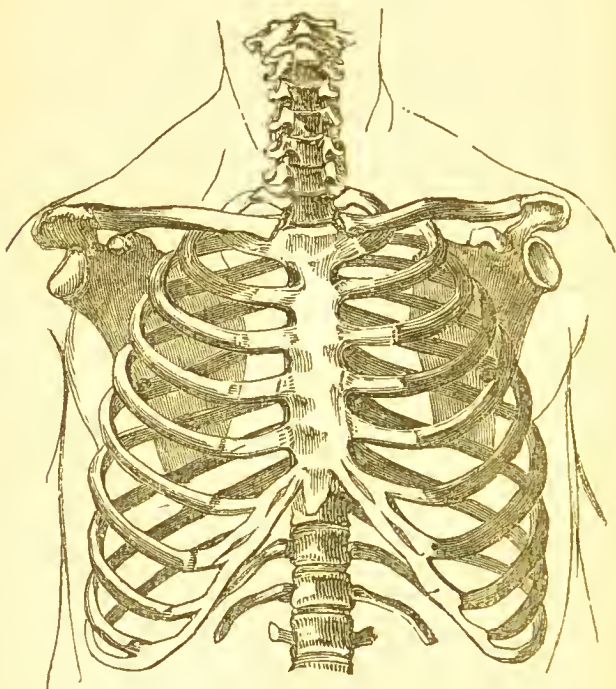
692. The chest is a common seat of muscular pains; and pain in the side (pleurodyne), is a common consequence of violent efforts in coughing; and pain in the left side is of very frequent occurrence in weak and delicate females. These muscular pains, which are apt to be mistaken for pleurisy, are developed by slight percussion with the points of the fingers, by the movements of the arms or trunk, and by a deep inspiration. The absence of pain on firm and gradual pressure, with its recurrence when the support is suddenly removed, is also a good diagnostic mark of muscular pain. Percussion with the fingers throws the muscles visibly into action through the whole length of their fibres, and, in certain cases, causes remarkable partial and transverse contractions, which are best seen in emaciated persons, and especially in advanced cases of consumption. These partial contractions are not confined to the muscles of the chest, but may be excited in the biceps and in other large muscles.

693. *Measurement.*—An actual measurement of the chest may have to be resorted to for two distinct purposes: in disease, as a means of diagnosis; in healthy persons as a measure of strength and vigour.

In disease we may wish to ascertain the size of the entire chest or of certain portions of it, or to determine the degree of expansion and enlargement which the entire chest, or parts of it, undergo during the act of inspiration. The progressive enlargement or diminution in the size of the chest which accompanies certain forms of disease, may also

be ascertained by repeated measurements made with great care, in the same position, and in the same state of the cavity. These measurements may be made with a graduated tape stretched from one point of the chest to another. To measure the size of the entire chest the tape should be carried horizontally round it, passing over the two nipples, or at an equal distance above or below them. When the amount of expansion due to the

Fig. 36.



movements of inspiration is to be ascertained, one end of the tape should be firmly held over the spinous process of one of the vertebræ, and the other be allowed to slide freely through the other hand held over the centre of the sternum. The chest should first be measured after a full expiration, and then after a deep inspiration: by shifting the tape we may measure the degree of expansion of both sides of the chest. In making these measurements the fact that the right side of the chest is naturally larger than the left by half an inch, must be borne in mind. The expansion of the chest in ordinary inspiration does not exceed an inch and a half, and it is somewhat greater on the right than on the left side.

694. In examining the chest with a view to test the strength and vigour of healthy persons, as in recruiting for the army, it is necessary to be provided with certain standards of comparison, and also to make allowance for the different degrees in which the muscles are developed,

and the parietes clothed with fat. In these examinations the expansion of the chest in the act of inspiration ought always to be noted. The act should be performed with evident ease and freedom; and the tape drawn tightly across the nipples should show a movement of not less than an inch.

695. The greatest circumference of the chest in robust men varies from 39 to 42 inches. In spare men of medium height it ought not to fall much short of 35 inches. In robust men the circumference of the chest bears to the height of the body the proportion of about 1 to 1.75. If in a man 5 feet 4 inches in height the average circumference of the chest is taken at 38 inches, an allowance should be made of half an inch in the chest-measurement for every inch added to the stature, thus:—

Stature in Inches.	Circumference of Chest.
64 . . .	38
65 . . .	38 $\frac{1}{2}$
66 . . .	39
67 . . .	39 $\frac{1}{2}$
68 . . .	40
69 . . .	40 $\frac{1}{2}$
70 . . .	41
71 . . .	41 $\frac{1}{2}$
72 . . .	42

696. It ought, however, to be understood, that the chests of very tall men are not, one with another, so large in proportion to their height as those of men of medium stature, nor are these taller men so capable of bearing fatigue as those of shorter stature.

697. A stethometer, or instrument for measuring the magnitude of the inspirations, has been invented by Dr. Richard Quain. It consists of a string passing round the chest, adjusted in the act of expiration, and when the chest is expanded by inspiration, indicating the amount of enlargement by a hand moving on a dial-plate. Dr. Sibson employs a similar instrument, especially for measuring the movements of particular portions of the chest.

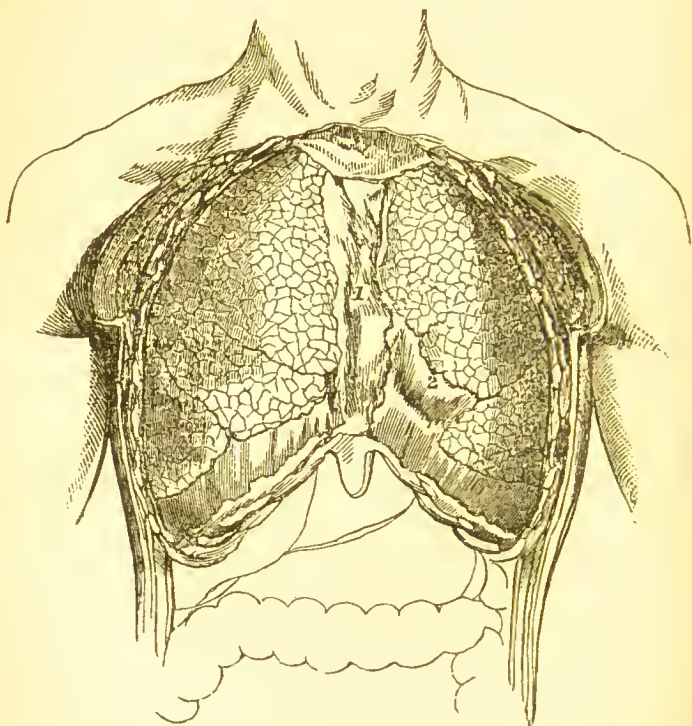
THE LUNGS.

698. The cavity of the chest (Fig. 36) consists of a hollow cone, of which the apex is cut off above by a horizontal plane, corresponding with the upper opening of the chest, and the base by an oblique plane, looking forwards and downwards, and constituting the lower opening. The upper opening is filled by the trachea, œsophagus, and large blood-vessels: the lower opening is closed by the diaphragm. This conical cavity is flattened before where the cartilages of the ribs are joined to the sternum, and behind where the ribs unite with the spine; but it is rounded at each side where it is formed by the ribs and their cartilages.

699. The principal parts contained within the cavity of the chest are

the lungs and the heart, of which the former occupy by far the larger portion. The size of the chest corresponds closely with the size of the lungs, and is liable to various deformities, in consequence of diseases affecting those organs. But the size and shape of the chest are also altered in certain diseases of the heart and large vessels.

Fig. 37.

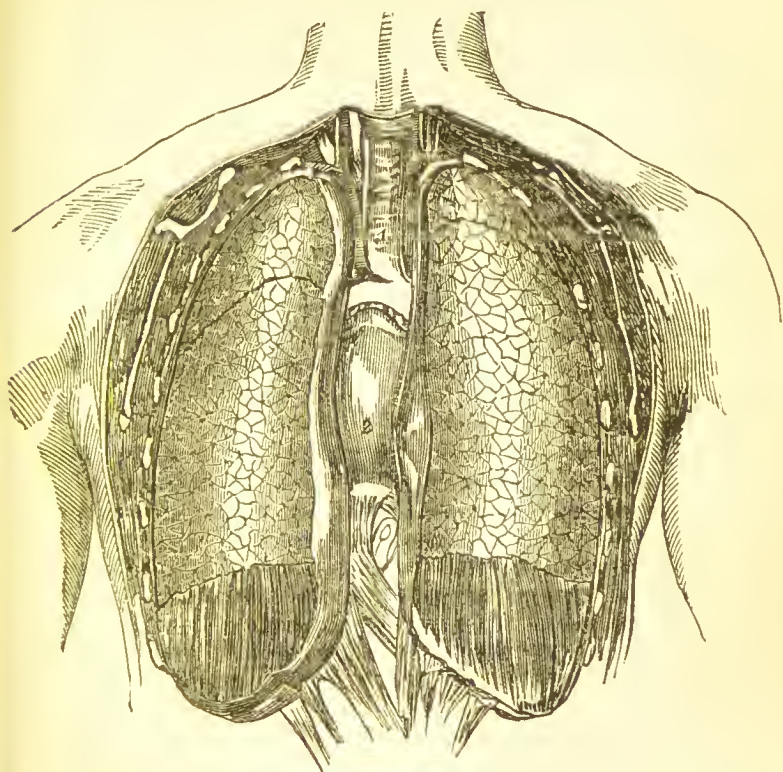


700. The lungs are in close contact with the walls of the chest in every part, with the exception of a small space (2, Fig. 37) to the left of the sternum, where the lungs leave a portion of the middle mediastinum containing the heart uncovered, and a narrow space (1) behind the sternum corresponding to the track of the large vessels.

701. Of the two lungs the right is the larger, but the left the longer, its apex rising somewhat higher, and its base sinking lower. The right lung reaches to about the level of the sixth rib in front, of the eighth rib at the side, and still lower behind. The left lung extends to the level of the seventh rib anteriorly, it reaches the eighth rib laterally, and descends still lower posteriorly. Both lungs applying themselves closely to the diaphragm, descend much lower behind than before, being there prolonged into thin wedges. The diaphragm separates them from the liver on the right side, from the stomach in the region

of the epigastrium, and from the spleen and colon on the left side posteriorly. (Figs. 37, 38, and 39.)

Fig. 38.

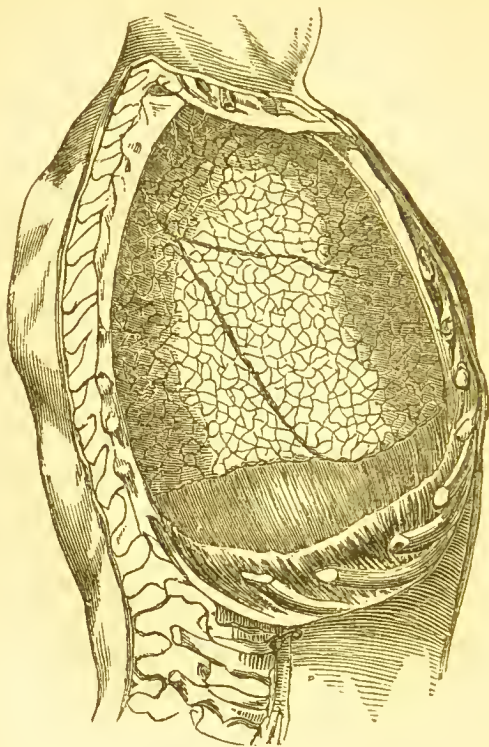


702. The chest is subjected to several kinds of examination, having special reference to the condition and functions of the lungs. Our object in these examinations is—1. To ascertain the number and character of the respirations. 2. To determine the capacity of the lungs. 3. To find out the true condition of the texture of the lungs.

703. 1. *The Number and Character of the Respirations.*—We may count the respirations in one of two ways: by observing the motions of the trunk or of some article of clothing which moves as it moves, or by placing the hand on the chest or abdomen. The first of these two methods is best adapted to the sitting or erect posture, the last to the recumbent posture. The most convenient plan is to cause the patient to lie down and to rest the hand on the abdomen, and then to grasp the wrist as if feeling the pulse. In either case, whether counting the respirations by sight or by touch, the attention of the patient should be withdrawn from the breathing, as the muscles of respiration are partially under the control of the will. The character of the respira-

tions, whether natural, slow or quick, easy or laboured, sighing, catching, or gasping, may also be ascertained in either of these ways.

Fig. 39.



704. In this place it may be well to observe that the character of the respiratory movements differs in the two sexes and at different ages. In very young children they are performed chiefly by the abdomen; in adults of both sexes mainly by the chest. In men the lower part of the chest, in women the upper part of the chest, is brought mostly into play, both in easy and in difficult breathing.

705. In very tranquil breathing, inspiration is performed almost entirely by the descent of the diaphragm, marked by a gradual protrusion of the abdomen; and expiration by contraction of the abdominal parietes. In ordinary respiration, however, the ribs are raised and tilted outwards during inspiration, to recover themselves by their own elastic reaction during expiration. In violent inspiration, not only the diaphragm and intercostals are called into play, but the scapulæ are raised and fixed. In violent expiration, as in coughing and sneezing, the abdominal muscles are brought into action, by which the viscera of the abdomen are compressed and the diaphragm forced upwards into

the chest. Yawning and sighing are forms of deep inspiration; coughing and sneezing, of violent expiration. Deep inspirations relieve the circulation by leaving greater space for the admission of blood into the heart, whilst violent expirations are chiefly of use by freeing the lungs or air-passages of noxious and irritating substances.

706. Attempts have been made to register the number of the breathings, and to ascertain the exact capacity of the chest.

707. *Number of Respirations.*—As the instrument which I have made use of for counting the respirations has not yet been employed at the bedside, a very brief description of it will suffice. It is an adaptation of one form of the pedometer. It resembles a large watch with a dial-plate graduated to 10,000, and furnished with two hands, one of which is set in motion by a string attached to a short chain. The instrument is fastened over the pit of the stomach by a band passing round the abdomen, and the string is made tense in the act of expiration, so as to set the long hand in motion, by fastening the free end to any fixed point at a short distance from the body. Every act of inspiration accordingly, by bringing the two fixed points nearer together, relaxes the string, while every act of expiration tightens it and sets the hand in motion, causing it to traverse one space on the dial-plate. The experiments, of which the results are given under the head of THE RESPIRATION, were performed by means of this instrument.

708. *Capacity of the Lungs.*—Two plans have been proposed for ascertaining the capacity of the lungs; the one by Dr. Lyons, the other by Mr. Abernethy. The latter plan was employed by Mr. Thackrah, of Leeds, and, with some modification, was adopted by Dr. Pereira, and has lately been much improved by Dr. Hutchinson. A portable spirometer is also in use, invented by Mr. Coxeter.

709. Dr. Lyons' method consists in noting the length of time required to empty the chest after a complete inspiration, by counting aloud. To render the expiration continuous and complete, the patient is required to count from 'one' upwards, as far as he can, slowly and audibly; and the number of seconds during which he is able to count is noted by a watch. The time occupied is a sort of measure of the capacity of the lungs. Dr. Lyons fixes the limit of time for perfectly healthy persons at thirty-five seconds: this is too low; for in more than one trial I have myself continued to count for forty seconds. In confirmed phthisis, Dr. Lyons says that the limit never exceeds eight, and is often less than six seconds; whilst in pleurisy and pneumonia it may range from four to nine. This method of measurement, though open to obvious objections, admits of useful application.

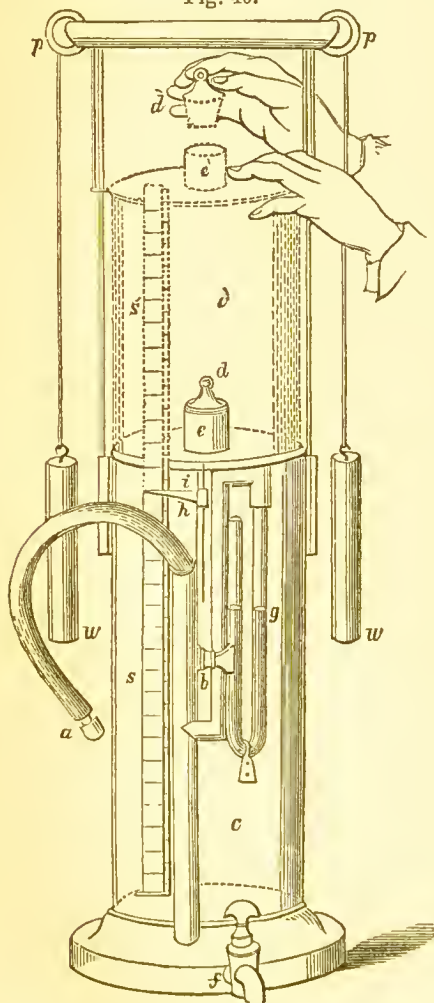
710. Mr. Abernethy's method consists in making the patient take a deep breath, and then causing him to expire through a bent tube, communicating with an inverted jar full of water. The quantity of water displaced is a measure of the capacity of the lungs. A person in good health, with sound lungs, can displace six or eight pints. If the

quantity displaced is much less than this, we may infer that the lungs are diseased, or compressed from without. "Muscular debility or spasm," says Mr. Abernethy, "may occasionally make the result doubtful, yet, in general, I believe it will afford useful information."

711. This method of estimating the capacity of the chest was also employed to a limited extent by Mr. Thackrah, of Leeds, who suggested that it might be useful in examining recruits. On examining nineteen officers and soldiers of the 14th Light Dragoons, he found the capacity

of chest to vary from 220 to 295 cubic inches; the majority expiring from 240 to 250 cubic inches. In tailors he found a mean of 221, and in shoemakers of 182 cubic inches.

Fig. 40.



712. The late Dr. Hutchinson improved on this rude method by substituting for the jar containing water a gasometer properly poised, and accurately adjusted. As his instrument is now used in several Assurance Offices, and is believed to afford useful indications in some cases of early chest affection, a woodcut, with a short description, is here introduced.

The instrument consists of a cylindrical vessel, *c*, capable of holding several pints of water, filled by a spout at the top, and emptied by a stop-cock, *f*, at the bottom. Into this vessel a cylinder, *c'*, of smaller size, counterpoised with the weights, *w w*, is inverted. The cover of this vessel has an opening, *e'* and *e*, in the centre, which may be closed at will by the plug, *d'* and *d*. An elastic tube, *a*, with a glass mouth-piece, and furnished with a stop-cock, *b*, communicates with the

lower vessel, *c*. The bent glass tube, *g*, also communicates with the

lower vessel, as does the glazed space, *i*. A graduated scale, *s'* and *s*, attached to, and moving with, the upper vessel, *c'*, and an index, *h*, complete the instrument. If we suppose the gasometer, *c'*, to be filled with air, so as to occupy the position indicated by the dotted lines, the instrument is prepared for use by taking out the plug, *d*, and lowering the gasometer till the coloured spirit in the two legs of the syphon, *g*, stands at the same level. The index, *h*, is then placed at the level of the water in the glazed space, *i*, which, communicating with the reservoir, *e*, shows the height of the water within, and at zero of the scale. The plug, *d*, is now replaced, the stop-cock, *b*, being supposed to remain closed. The subject of the experiment then fills his chest completely, and applying his mouth to the mouth-piece, and at the same time opening the stop-cock, *b*, discharges the air from his lungs. The gasometer rises, the stop-cock, *b*, is again turned so as to close the passage for the air, the coloured liquid in the syphon, *g*, is again brought to a level in the two legs, and the height of the scale above the index marks the number of cubic inches, and measures, if the experiment has been properly performed, the capacity of the lungs, or, to speak more correctly, 'the quantity of air which an individual can force out of his chest by the greatest voluntary expiration, after the greatest voluntary inspiration.'

713. By very numerous observations made with this instrument, Dr. Hutchinson established certain averages for the healthy chest, which he then used as standards of comparison for the chests of consumptive patients. He found the limits of the capacity of the chest in health to be 80 cubic inches in a dwarf measuring 3 feet 9 inches, and 464 cubic inches in a giant measuring 6 feet 11½ inches. He also ascertained that the capacity of the chest was 40 or 50 cubic inches below the mean in very fat persons; that it was reduced from 4 to 6 inches by a moderate meal, and from 9 to 14 cubic inches by a full meal; that it is greatest in the erect posture; that it diminishes after 55 years of age; that it bears a remarkable relation to the stature; and that it is much diminished in pulmonary consumption.

714. The following table presents in the first column the ascertained or calculated capacity of the lungs in healthy persons between the ages of 15 and 55, of different statures, from 5 to 6 feet; and in the second and third columns the capacity of the lungs of persons of the same stature, suffering from the early and advanced stages of pulmonary consumption. (The table is taken from Dr. Hutchinson's work on the Spirometer, the figures 5 feet 1 inch, 5 feet 2 inches, &c., being substituted for 5 feet to 5 feet 1 inch, 5 feet 1 inch to 5 feet 2 inches, &c.)

Stature.		Capacity.		Early Stage of Consumption.	Advanced Stage of Consumption.
Fect.	Inches.	Healthy Males.	Cubic Inches.		
5	1	-	174	117	82
5	2	-	182	122	86
5	3	-	190	127	89
5	4	-	198	133	93

<i>Stature.</i>		<i>Capacity. Healthy Males.</i>		<i>Early Stage of Consumption.</i>	<i>Advanced Stage of Consumption.</i>
Feet.	Inches.	Cubic Inches.		Cubic Inches.	Cubic Inches.
5	5	-	206	-	97
5	6	-	214	-	100
5	7	-	222	-	104
5	8	-	230	-	108
5	9	-	238	-	112
5	10	-	246	-	116
5	11	-	254	-	119
6	0	-	262	-	123

715. The disparity here proved to exist between the capacity of the lungs in healthy persons, and in persons of the same stature labouring under incipient and advanced consumption, is so considerable as in itself to prove the utility of this instrument. But it must be borne in mind that emphysema and bronchitis, as well as diseases of the heart encroaching on the lungs, would give rise to the same results. In making a practical application of the figures contained in the first column, it would probably be unsafe to set down to the account of disease of the lungs a moderate diminution of capacity; though Dr. Hutchinson himself is of opinion that if a man between 5 feet 7 inches and 5 feet 8 inches, who ought to expel about 220 cubic inches of air, can expel no more than 185 cubic inches, or if a 6-foot man, who ought to expel about 260 cubic inches, is not able to expel more than 200 or 220 cubic inches, disease may be suspected to exist. When we bear in mind the modifications in the capacity of the lungs due to the causes specified in § 713, and especially that, according to Dr. Hutchinson's statement, 'very fat men, of any stature, may blow 40 or 50 cubic inches less than the mean, and yet not be diseased in the chest,' it is but reasonable to suppose that other causes compatible with health may lessen the capacity of the chest. It will be seen, however, that the figures in the second column are so much below those belonging to the healthy chest, as to furnish in themselves a very strong presumption of the existence of disease.

716. It is scarcely necessary to observe, that in making use of Dr. Hutchinson's instrument, the patient should be in the erect posture, and that he should be narrowly watched to see that he performs the operation of expanding his chest and expelling the air carefully and properly. Allowance must also be made for advance in age above 55.

717. Dr. Hutchinson also made a great number of observations, by means of an instrument of his own invention, upon the inspiratory and expiratory power, or the force exercised by the muscles of inspiration and expiration in inspiring or expiring air through the nostrils. As these experiments have obviously no very important practical bearing, this short notice of them will suffice.

718. The instrument invented by Mr. Coxeter has the advantage of being more portable and cheaper than Dr. Hutchinson's apparatus, and in the hands of a practised person, using it always in the same way, would

afford useful indications. It consists of two flexible, inelastic, and air-tight bags—one large, the other small—connected by a tube fitted with a stop-cock. The larger bag has a second stop-cock fitted with a glass mouth-piece; and the smaller bag, which is graduated to 50 cubic inches, has also a second stop-cock. In using this instrument we close the stop-cock between the two bags, and open that fitted with the mouth-piece. Through this mouth-piece the patient, having taken a deep inspiration, discharges the contents of the chest into the larger bag. The stop-cock to which the mouth-piece is attached is then closed. The smaller bag being empty, and its terminal stop-cock closed, the central stop-cock is opened, and the bag filled with air. The central stop-cock is again closed and the terminal stop-cock opened, so as to allow the contents of the small bag to be expelled. This done, the same process is repeated till all the air contained in the larger bag has been transferred to the smaller one and measured off. As the results obtained with this instrument differ little from those obtained with Dr. Hutchinson's spirometer, the figures of the last table may be employed indifferently with either instrument.

719. *Condition of the Texture of the Lungs.*—The means which we employ for ascertaining the condition of the texture of the lungs are familiarly known as percussion and auscultation.

720. *Examination of the Lungs by Percussion and Auscultation.*—The ear is employed in two ways in examining the lungs,—in listening to the sound occasioned by striking the walls of the cavity, and in listening to the sounds produced in the chest itself by the passage of air through the lungs, and by the movements which take place between the lungs and the chest. Both these modes of examination are comprised in the meaning of the term auscultation; but it is usual to call the first *percussion*, and the second *auscultation*.

721. *Percussion.*—If the chest, instead of containing a variety of solid parts, were filled with air, it would yield, when struck, a sound like that of an empty barrel or drum; if, on the contrary, it were filled with solid animal substance, it would sound as dull as the arm or thigh. But containing, as it does, a spongy organ, the lung, including in its tissue a large quantity of air, it yields, when struck, a hollow sound, but one less hollow than that which it would give if containing only air. The more air it contains, the more hollow it sounds; hence the sound is clearer during inspiration than during expiration. If, again, the texture of the lung be so altered as to admit a larger quantity of air, as in emphysema, the chest yields a clearer sound. On the other hand, if the lung from any cause admit less air than usual, the sound becomes more dull: this happens in congestion, in inflammation, in tubercular deposit; when solid tumours form in the lung itself, or occupy its place; as also when the lung is compressed by fluids collected in the sac of the pleura (hydrothorax and empyema). But if, instead of fluid, there is air in the cavity of the pleura (pneumothorax), the sound is more hollow than if the healthy lung were in contact with the walls of the chest.

722. The chest, then, yields a hollow sound when it contains air, a dull sound when air is excluded; the degree of hollowness or dullness depending upon the quantity of air. But there is another cause which influences the nature of the sound, viz., the thickness of the walls of the chest itself. If two chests contain exactly the same quantity of air, that will give the clearest sound which has the thinnest walls. Where the walls of the chest are padded with muscle or fat, the sound is more dull. Where there is little muscle it is more clear. Thus, it is dull over the pectoral muscles and over the back part of the chest above; but clear above and below the clavicles, in the arm-pits, and below the angles of the scapula. In the healthy chest, then, the clearness of the sound will vary directly as the quantity of lung beneath the part struck, and inversely as the thickness of the parietes in that part.

723. Again, wherever the substance of the lung is thin, the sound on percussion is modified by the parts lying immediately behind it: thus, below the fourth rib, the layer of lung in front of the liver on the right side is thin; the sound is consequently less clear than in the upper part of the chest. The thin layers of lung which overlay the heart, so as to leave only a small portion of it uncovered (2, Fig. 37), have the same effect. In all such cases where a thin layer of healthy lung lies in front of a solid organ, gentle percussion elicits the clear sound of the healthy lung, strong percussion that of the solid substance behind it. The limits of this clear sound heard on gentle percussion are somewhat extended by a deep inspiration, which stretches and expands the lungs, and diminished by a forcible expiration, which contracts them. Tumours in the deeper seated portions of the lung, or consolidation of the lung itself, have the same effect as a solid viscus. Gentle percussion elicits the clear sound of the healthy lung, and strong percussion the dull sound of the tumour or condensed lung beneath.

724. The mass of the liver in the right hypochondrium explains the dull sound caused by percussion below the level of the sixth rib; the stomach, which usually contains flatus, accounts for the clearer sound generally heard on the left side.

725. In examining the chest, the patient should be placed in the erect or sitting posture, and, if possible, in an open room. Curtains and bed-clothes dull the sound. The chest should be bare, but in females it may be covered by a single layer of clothing. Each part of the chest submitted to examination should be rendered as tense as possible; the anterior part by stretching the neck and throwing back the shoulders; the supra-clavicular space by turning the neck to the opposite side; the axillæ, by raising the arms above the head; and the back part of the chest by causing the patient to fold his arms and stoop down. In order to compare opposite and corresponding points of the chest, the position of both sides must be the same. If we are examining the front of the chest, the hands must fall loosely at the sides; if the sides, they must be raised equally above the head; if the back, they must be equally folded.

726. There are different ways of eliciting the sounds of the chest by

percussion. We may strike with the points of the fingers, or with the flat of the hand; or we may interpose the fingers of the opposite hand, or a thick piece of India-rubber, or a plate of wood or ivory. Such things are called "plessimeters," and percussion, by means of them, is named "mediate percussion." Attempts have also been made to combine a plessimeter with a hammer so arranged as to strike the plate each time with the same force. The best of the kind is Dr. Sibson's "spring plessimeter," which consists of a round pad of India-rubber fixed to the end of an axis, and striking upon a plessimeter of ivory. The axis works through a collar, and being raised, is made to fall each time with equal force by means of two elastic springs.

727. Direct percussion with the points of the fingers should never be employed, except when we wish to set the muscles in action. In many cases, especially in advanced phthisis pulmonalis, the skin and muscles are acutely sensitive, and the slightest touch occasions pain. This is a sufficient objection to direct percussion with the finger. Percussion with the open hand, or closed fist, is little used, except as a means of contrasting the two sides of the chest over their whole extent at once.

728. Mediate percussion ought always to be preferred, and the readiest plessimeter is formed by a finger of the left hand applied to the surface with a firm pressure, especially in stout, flabby, dropsical, or emphysematous subjects. By such pressure the skin and flesh are condensed, and made better conductors of sound. The finger should then be sharply struck by the three middle fingers of the right hand, taking care to strike perpendicularly to the surface, and not obliquely. In comparing the two sides of the chest, care should be taken to strike the same point, with the same force, and in the same condition of the chest, whether filled with air in inspiration, or partly emptied by expiration. The comparison can be most accurately made when the breath is held.

729. The chief indications given by percussion in disease, by clear and dull sounds respectively, are shown in the following table:—

	<i>In the Lungs.</i>	<i>External to the Lungs.</i>
Clear Sound on Percussion.	{ Healthy condition. { Emphysema. { Tubercular excavation.	Pneumothorax.
Dull Sound on Percussion.	{ Congestion, hepatization, and condensation. { Pulmonary apoplexy. { Edema. { Tubercular deposit. { Other morbid degenera- tions.	Pleuritic effusion. Hydrothorax. Hæmatorax. Tumours in pleura or media- stium. Diseases of heart or arteries, with enlargement.

730. From the part of the chest in which the clear or dull sound occurs, we may often infer the cause by which it is produced. Thus emphysema, though it may be confined to one side, and to a limited spot, commonly occurs on both sides of the chest at once, and over a large portion of the lungs; pneumothorax, on the contrary, is usually con-

fined to one side, and tubercular excavations occupy, for the most part, the upper part of the lungs.

731. A dull sound may arise from a greater variety of causes. Congestion and hepatization, the consequence of pneumonia, occupy chiefly the lower lobes, generally on one side, but sometimes on both; œdema commonly exists in both lungs at the same time; tubercular deposit is found chiefly in the upper lobes; whilst other morbid degenerations occupy all parts of the lungs indifferently. Of causes external to the lungs, effusion of blood or pus into the cavity of the pleura is commonly confined to one side; hydrothorax usually extends to both; tumours in the pleura and mediastina may occupy any position: diseases of the heart affect the neighbouring parts; and aneurismal tumours chiefly the upper and anterior part of the chest.

732. *Auscultation*.—The passage of air through the various structures of the lungs, in inspiration and expiration, produces certain sounds, which are easily recognised on applying the ear or the stethoscope to the chest. They vary in different parts of the chest. In the neck, and over the upper part of the sternum during inspiration, a hollow, blowing sound is heard—this is tracheal respiration; on each side of the upper part of the sternum, between the scapulæ, and sometimes in the axillæ, a whiffing tubular sound is heard—this is bronchial respiration; on most other parts of the chest a sound is heard which has been compared to that of a sleeper breathing gently through the nostrils, or to the sighing of a gentle breeze—this is called vesicular, from its presumed seat, the air-cells. This sound is heard both in inspiration and expiration; but the expiratory murmur is less distinct, and of shorter continuance. When, as is the case in children, this breezy murmur is very distinct, it is termed *puerile respiration*.

733. The intensity of this respiratory murmur varies in different healthy persons, and in the same person at different times. It is more intense, as has just been stated, in young children, and also in females. It is also augmented by deep inspiration; hence, when the sound is naturally dull, it may be increased by causing the patient to breathe quick, to draw a deep breath, or to cough, whereby the lungs are emptied, and a full inspiration secured. The respiratory murmur is also rendered more intense, or becomes *puerile*, in one part of the chest by consolidation of the rest of the lung; or by such impediments to the free action of other parts of the lung as are offered by tight stays in women.

734. The respiratory murmur is sometimes scarcely audible; but if this indistinctness do not coexist with other morbid sounds, and with dulness on percussion, it does not indicate disease.

735. The respiratory murmur may also be absent in limited portions of the chest, through the bronchial tubes being obstructed by tenacious mucus; but here percussion will give a clear sound; or it may be absent, because the air-cells are filled with fluid from within, or compressed from without, when the chest will sound dull on percussion, unless the pressure be occasioned by air in the pleura.

736. The *bronchial* respiration in health is heard in parts of the chest corresponding with the track of the large bronchial tubes; but if the lung be condensed, it not only loses its proper respiratory murmur, but, being a better conductor, conveys to the ear the sound produced in the bronchial tubes. Hence, bronchial respiration heard with unusual distinctness near the site of the bronchial tubes, or heard on one side when not audible on the other, or with widely-differing intensity in the two sides, or in parts where it is not heard in health, is an indication of consolidation of the lung by inward disease or outward pressure.

737. The bronchial respiration, as thus heard, either resembles puerile respiration in an intense degree; or the noise made by drawing the breath through the closed hand; that occasioned by blowing into a quill; or, lastly, the short puff used in blowing out a candle.

738. To the same class of sounds belongs the *cavernous* respiration, which, in its most marked form, produces a perfect illusion of air drawn through the stethoscope during inspiration, and puffed into the ear during expiration. It generally arises from a dilated bronchus, but occasionally from a cavity in the substance of the lung.

739. The *amphoric* respiration closely resembles the sound produced by blowing into a bottle, and is caused by the passage of air into a cavity lined with a dense membrane.

740. Besides the respiratory sounds produced in the tubes and air-cells of the lungs, when those parts are moistened by their natural secretions in their natural quantity, there are other sounds due to the increased resistance offered to the passage of air by constriction of the parts themselves, or by fluids of various degrees of consistence.

741. The variation in character and intensity of these sounds is indicated by the terms *râle* (rattling), *rhonchus* (snoring), *crepitation* (crackling), and *sibilus* (hissing, wheezing, or whistling). *Crepitations* are further distinguished as *dry* and *moist*—the dry being due to the swelling of the mucous membrane, constriction of the tubes, or obstruction from viscid phlegm; the moist to fluids of less consistence accumulated in the tubes or cells.

742. *Râles* are limited to the larynx, trachea, and bronchial tubes; *Rhonchus* and *Sibilus* are produced in the largest and medium-sized tubes; and *Crepitation* is limited to the fine air-tubes and the air-cells.

743. *Crepitation* is of two kinds—*fine* and *coarse*. Fine crepitation is produced in the air-cells and finest air tubes; it is one of the most delicate of the lung sounds, resembling that caused by rolling a lock of hair between the thumb and finger. Coarse crepitation has its seat in the finer and medium-sized air-tubes; it is nothing more than fine mucous râle. Between these extremes there is every intermediate gradation.

744. Crepitation is further subdivided into *moist* and *dry*. *Moist* crepitation (*râle crepitant* of Laennec) is a rapid succession of fine sub-

duced crackles, resembling that produced by throwing salt on a hot iron plate. The sensation may be *felt* by compressing healthy lung tissue, or emphysematous integument. It exists in all cases where the finer bronchi and air-cells are partially filled with viscid fluid, provided that they still admit the passage of air. Hence it is present in œdema and apoplexy of the lungs; occasionally in pulmonary catarrh and bronchitis; often in the first stage of phthisis; and in the first stage of pneumonia, as its most constant and characteristic sign; it disappears when hepatization comes on, and reappears when the inflammation is subsiding, and the lung begins to resume its healthy condition. In the first and last of these stages the moist crepitant rhonchus alters and obscures the respiratory sound, but does not completely mask it; in the stage of hepatization, both sounds are absent.

745. *Dry crepitation.* (*Râle crepitant sec à grosses bulles*, or *craquement of Laennec*.) This sound resembles that produced by blowing into a dried bladder. It occurs only in emphysema of the lungs, and is most distinctly heard in interlobular emphysema. It is only heard during inspiration.

746. *Rhonchus and Sibilus.*—These sounds are indicative of a dry condition of the mucous membrane. They are generally associated, producing *sibilant rhonchus*. The *sibilant* resembles a prolonged whistle, or the chirping of birds, or the sound emitted on the sudden separation of two portions of smooth oiled stone. The *sonorous* resembles the snore of sleep, the bass note of a violoncello, or the cooing of a pigeon. When intense, it may be perceived by the hand placed upon the chest. All these varieties of sound arise from contraction of a portion of a bronchial tube by swelling of the mucous membrane, by pressure of a limited portion of consolidated lung, or by a plug of tenacious mucus, the sibilant rhonchus existing in the smaller, and the sonorous in the larger tubes. A *click* is also sometimes heard, either during inspiration or expiration, arising from the sudden displacement of a portion of viscid mucus.

747. The *moist bronchial rhonchus* is called the *mucous râle* (*râle muqueux of Laennec*). It is due to the passage of air through tubes containing a fluid, and closely resembles the sound caused by blowing through a pipe into soap and water. It is present in pulmonary catarrh, bronchitis, and hæmoptysis; and in all diseases accompanied with much expectoration, as in the third stage of pneumonia, and in phthisis. The *tracheal râle* is a mere modification of this sound, existing in the trachea when filled with fluid. It has been compared by Laennec to the rolling of a drum at a distance, or the noise of a carriage in a paved street. The *cavernous rhonchus* occurs in empty cavities of the lung, and is of extremely rare occurrence. The cavernous râle is caused by the bubbling or gurgling of a fluid in a *circumscribed cavity*. It is a sure sign, therefore, of a cavity in the lungs, which, in ninety-nine cases out of a hundred, is of tuberculous origin.

748. *Vocal Sounds*.—In addition to the sounds just described, there are others which are produced by the *voice*. In a healthy chest, we commonly perceive a diffused resonance, which is most distinctly heard between the scapulæ, in the situation of the bronchial tubes. If we place the hand on the chest in the act of speaking, especially if the voice be a bass, we perceive a vibration, or *fremitus*. If we place the stethoscope over the larynx or trachea, the voice seems to pass through the tube to the ear, being much more clearly perceived by the ear applied to the stethoscope than by the other. This sound is called *laryngophony*. A similar sound is heard when the lungs between the bronchial tubes and the parietes of the chest are condensed, and especially if the bronchi are at the same time enlarged. This is *bronchophony*. If in the cavity of the pleura, external to a condensed lung, a thin layer of fluid is deposited, as happens in recent cases of pleurisy, a sound is heard like the bleating of a goat, or the squeaking of Punch. This is *æyophony*. Again, in cases of pulmonary excavation, the sound of the voice passes through the tube to the ear, as in laryngophony, and receives the name of *pectoriloquy*. Lastly, when a large cavity, communicating with the bronchi, containing fluid and filled with air, exists in the chest, a sound is produced during respiration, by speaking, or in coughing, which resembles either the falling of a pin into a cup or glass, or that caused by blowing quickly and forcibly into a bottle with a narrow neck. The first is called *metallic tinkling*, the second *amphoric resonance* or *buzzing*. These sounds are heard most distinctly in pneumothorax; but they also occur in large abscesses of the lungs. In very rare cases of pneumothorax this metallic tinkling has been produced by each beat of the heart.

749. There is one sound, which, though due to an external cause, may be confounded by the beginner with sounds produced within the chest—the *muscular sound* (*bruit musculaire*). It is always heard during muscular contraction, and is peculiarly distinct in patients shivering with cold, or when the muscles are put upon the stretch. When the neck and shoulders are forcibly thrown back in examining the anterior part of the chest, when the hands are forcibly raised above the head, or the arms strongly folded across the chest, the patient stooping at the same time, this sound is very distinctly heard. It is an extremely rapid vibrating sound, bearing a close resemblance, when strongly marked, to the distant rumbling of carriages over a paved street. The pupil should make himself familiar with this sound, by placing his ear on the pillow, and contracting the masseter muscles with different degrees of force and quickness, taking care, at the same time, to avoid grating the teeth. When he closes the jaw gently, he will hear the rapid vibration just mentioned; a stronger contraction will render the vibration still more rapid; a strong and abrupt contraction closely imitates the first sound of the heart; a still stronger and quicker one produces a sound which might be confounded with the “*bruit de soufflet*,” and the strongest and most abrupt contraction causes a species of cooing sound. The ear applied

to the biceps muscle during strong contraction, or to the abdominal muscles during a violent and abrupt expiratory effort, perceives a sound not easily distinguished from the first sound of the heart. The continuous nature of the "bruit musculaire" distinguishes it at once from all the respiratory sounds.

750. It only remains to mention two sounds which have their source external to the lungs, in the sac of the pleura. The one is a *friction* or *to-and-fro* sound, occurring both in inspiration and expiration when the pleuræ are dry and rough with deposits; the other a *splashing* sound, distinctly heard by the ear applied to the chest of a patient suffering from a mixed collection of air and fluid in the cavity of the pleura, when a sudden jerk (*succussion*) is given to the chest. This splashing sound is sometimes heard in very large tuberculous cavities.

751. The young auscultator may consult with advantage the following table, which presents at one view some of the chief points just stated. It is taken, with some modifications, from Dr. Williams's article on the Diagnosis of the Diseases of the Chest, in the Library of Practical Medicine, vol. iii. p. 18.

SOUNDS PRODUCED BY THE PASSAGE OF THE AIR IN RESPIRATION.

NATURAL.

Tracheal; heard in the neck and at the top of the sternum.

Bronchial; near the upper part of the sternum, and between the scapulæ.

Vesicular; on most other parts of the chest.

MORBID.

Bronchial Respiration; from condensed lung.

Cavernous, } in morbid cavities, communicating with the
Amphoric; } bronchi.

Moist Sounds. { *Mucous râle*; liquid in bronchi.
 { *Crepitation*; viscid liquid in small tubes and air-cells.
 { *Gurgling*; liquid in morbid cavity.

Dry Sounds. { *Sibilus*.
 { *Sibilant rhonchus*.
 { *Sonorous rhonchus*.
 { Contraction of bronchi, by
 { swelling of mucous membrane,
 { by pressure, or by tenacious
 { mucus.

Dry crepitation; in emphysema.

Cavernous rhonchus; in morbid cavity destitute of fluid.

SOUNDS OF THE VOICE TRANSMITTED THROUGH THE CHEST.

NATURAL.

Laryngophony; over larynx.

Tracheophony; over neck and upper part of sternum.

Bronchophony; near top of sternum, between the scapulæ, &c.

(*Pectoral fremitus*, or *vocal vibration*; perceptible to touch in many parts of chest.)

MORBID.

Bronchophony; sound of voice through condensed lung.

Ægophony; the same, vibrating through a thin layer of fluid.

Pectoriloquy; the same in a cavity of the lungs.

Tinkling, &c.; a changed echo of voice or cough in a large cavity containing air and liquid.

SOUNDS PRODUCED BY THE MOTIONS OF THE LUNGS.

Friction-sounds, when the pleuræ are dry or rough from deposit.

SOUND PRODUCED BY SUCCUSSION.

A *splashing sound*, when the cavity of the pleura contains fluid mixed with air; or when the same combination occurs in a tuberculous cavity of large size.

SOUNDS PRODUCED BY THE CONTRACTION OF THE MUSCLES.

Vibratory sounds of varying intensity.

THE HEART.

752. The position of the heart and large vessels, and their relation to the walls of the chest, and to the lungs, will be best understood by referring to the woodcuts at pp. 164 and 182. It will be seen that the lungs, which fill so large a part of the chest, leave an irregular space (1 and 2, Fig. 37) in the anterior part of its cavity unoccupied. That part of this space (1) which lies behind the upper half of the sternum, is of a nearly uniform width of two inches, the anterior edges of the two lungs being at this part of the chest nearly parallel. The lower portion of this space (2), on the other hand, being formed by the wide separation of the left lung from the right (which latter continues its nearly straight course along the right margin of the sternum), is of an irregular triangular shape. The upper portion of this space corresponds to the large vessels, the lower portion to the heart. This space, however, by no means represents the size and shape of the heart and large vessels, but merely of such portions of them as are not concealed from view by the thin edges of the lungs overlapping them; nor can the heart and large vessels be fully seen until the pericardium has been opened, the cellular membrane connected with it dissected away, and the lungs turned aside to the right and to the left. Posteriorly (Fig. 38), the inner edges of the two lungs are nearly parallel, leaving a centre space (1 and 2) about two inches wide, occupied by the trachea and œsophagus above, and by the œsophagus and descending aorta below. In consequence of the great thickness of the spine and muscles of the back, this space does not afford facilities for stethoscopic examination.

753. The pericardium, which surrounds the heart, is firmly attached to the large vessels connected with its base above, and to the diaphragm below; so that the heart itself beats within this fibro-serous sac, sub-

jeet to be pulled down with it, when the diaphragm descends in the act of inspiration, and to be raised with it when the diaphragm is moved upwards during expiration.

754. As the large vessels, which are firmly bound to each other, and to surrounding parts, spring from the base of the heart, and as the short ascending cava connects the base with the tendinous portion of the diaphragm, that part of the organ is not subject, in healthy persons, to any material alteration of position.

755. The large vessels, therefore, form a sort of fixed point on which the heart moves. From this fixed point it is tilted and twisted forward during the contraction of the ventricles; towards this same point it is raised with the diaphragm, during expiration; and from this point it is pulled downwards into a more vertical position during inspiration. These changes of position are exaggerated by the ribs moving in opposite directions to the diaphragm.

756. The change of position due to the movements of inspiration and expiration, is so considerable, that, during a deep inspiration, the apex of the heart, instead of beating in the fifth intercostal space, may be felt in the sixth, but indistinctly, in consequence of the elevation of the ribs drawing the lung in front of it. By a forced expiration, on the other hand, the ribs are drawn down and brought more completely into contact with the heart, so that it may be felt beating in the fourth intercostal space, and even as high as the third rib.

757. The same act of inspiration which depresses the diaphragm, and tilts the ribs outwards, expands the lungs, so that their anterior edges slide over the pericardium; and the same act of expiration which forces the diaphragm upwards, and pulls the ribs downwards, causes the lungs to collapse, and their anterior edges to slide back again, thus leaving more of the pericardium exposed. A distended stomach, or an enlargement of the abdomen, from whatever cause arising, will have the same effect on the position of the heart as an act of expiration.

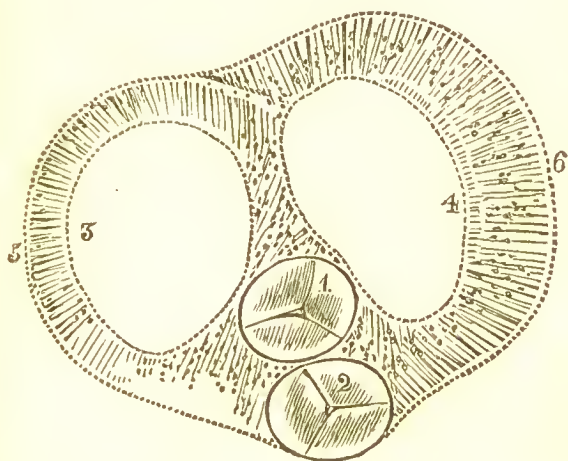
758. In consequence of the freedom of motion which the heart enjoys, it is affected by the posture of the body, falling back a little from the anterior walls of the chest when we lie down, and moving somewhat to the right or left, as we lie on the sides.

759. The heart, then, occupies an oblique position within the chest, so that, when we stand or sit, the base, fixed by the attachments of the large vessels, is directed upwards, backwards, and to the right side; the apex downwards, forwards, and to the left; the base separated from the fifth, sixth, and seventh dorsal vertebrae by the descending aorta and œsophagus; the apex, when the ventricles are contracted, and the respiration tranquil, corresponding to the space between the fifth and sixth ribs—a point about two inches below, and one inch to the inside of the left nipple, or two inches and a half from the left border of the base of the ensiform cartilage. One half of the heart, consisting of a small part of the left auricle and the whole of the left

ventricle, and the left vertical half of the right ventricle, lies to the left of the sternum, behind the cartilages of the fourth and fifth, and the sternal articulations of the fifth, sixth, and seventh ribs, and the fourth, fifth, and sixth intercostal spaces: the other half of the organ, consisting of nearly all the remainder of the right ventricle, lies behind the lower half of the sternum, a small portion only of the ventricle and the right auricle being behind the sternal articulations of the third, fourth, and fifth ribs, and the fourth and fifth intercostal spaces of the right side. The flat under and posterior surface of the left ventricle lies upon the diaphragm, which separates it from the left lobe of the liver; the rounded upper and anterior right ventricle is turned upwards and forwards, separated from the sternum and thin anterior edges of the lungs by the pericardium and loose cellular membrane connected with it.

760. The orifices and valves of the heart, which are the seat of the principal abnormal sounds heard on applying the ear or the stethoscope to the region of the heart, are very close to each other, the orifice of the aorta (1 Fig. 41) lying nearly directly behind that of the pulmonary

Fig. 41.



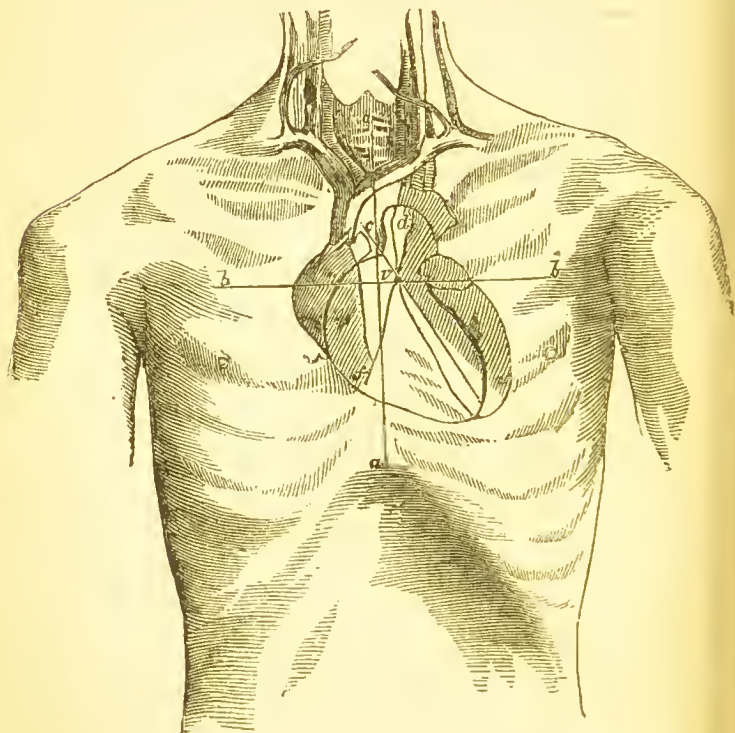
artery (2), while the right and left auriculo-ventricular orifices (3 and 4) are only a third of an inch apart, and just below those of the arteries. The diagram (Fig. 41) shows both the relative positions of the valves and the relative thickness of the walls of the right ventricle (5) and left ventricle (6).

761. The position of these valves in the healthy subject, relatively to the bones and walls of the chest, has been determined by transfixing

them with needles. It has been thus ascertained that, in the recumbent position, the bulging portion of the pulmonary artery corresponds to the interspace between the second and third ribs of the left side, close to the sternum. Consequently a line, *b b*, Fig. 42, drawn across the sternum to the inferior margin of the third ribs, passes over the valves of the pulmonary artery, a little to the left of the mesial line (at *v*), and about half an inch above the valves of the aorta, which lie (in the erect position of the body) behind the pulmonic valves. The auriculo-ventricular orifices will, in like manner, be found to correspond to a line drawn across the sternum at a somewhat lower level in the interspace of the third and fourth ribs, the valves themselves being situate somewhat to the right and left of the semilunar valves of the aorta and pulmonary artery respectively.

762. As a knowledge of the exact relation of the heart itself, and of its several constituent parts, to the bones and walls of the chest, is of

Fig. 42.



the first importance, with a view to a sound diagnosis of diseases of the heart, the principal points already stated will be briefly recapitulated, reference being made to the annexed engraving.

763. 1. *Parts of the Heart and Large Vessels not covered by the Lungs, and separated from the walls of the Chest only by the Pericardium and loose Cellular Tissue.*—The root of the pulmonary artery; the ascending aorta; the anterior surface of the right ventricle; a small portion of the appendix of the right auricle, with the apex and anterior margin of the left ventricle. See 1 and 2, Fig. 37, and the unshaded portion of the heart in Fig. 38.

2. *Pulmonary Artery.*—Close to the sternum, in the interspace of the second and third ribs of the left side.

3. *Aorta.*—The ascending aorta lies behind the mesian line of the sternum; it makes its first bend behind the manubrium, and is thence directed obliquely backwards and to the left side, forming the arch, the crown of which is on a level with the first intercostal space. The descending aorta commences on the left side of the third dorsal vertebra.

4. *Valves of the Pulmonary Artery and Aorta.*—The first of these is situated immediately to the left of the intersection of a line, *b b*, drawn across the sternum to the inferior margins of the third ribs, with the mesial line, *a a*. The latter lie immediately behind those of the pulmonary artery, on a level with the body of the fifth dorsal vertebra.

5. *Auriculo-Ventricular Valves.*—To the right and left of the valves of the aorta and pulmonary artery respectively, about a third of an inch apart, the tricuspid being somewhat lower than the mitral.

6. *Apex of the Heart.*—The heart's beat, when the body is erect and the respiration tranquil, is felt between the fifth and sixth ribs of the left side, an inch and a half below, and an inch to the inside of the left nipple.

764. In examining the heart, three points demand attention—its position and size, its motions, its sounds.

765. *Position and Size of the Heart.*—These are determined chiefly by percussion, and, in certain cases, though with less accuracy, by the touch. In healthy and well-formed persons a dull sound is elicited by percussion over an area of about two inches in diameter, extending from the point where the beat of the heart is felt to the left side of the lower half of the sternum. This space, which corresponds to the part of the heart uncovered by the lungs, yields a dull sound, both on strong and slight percussion. Beyond this space the sound, on percussion, is gradually softened off, in proportion as the thickness of the overlapping lung increases; but, on strong and sharp percussion, the dull sound of the heart is heard through the intervening portion of lung. When the heart is enlarged, or when the pericardium is filled with fluid, the region of dulness is increased; the same effect is produced by consolidation of the surrounding portions of lung, by tumours intervening between the pericardium and the walls of the chest, by partial pleuritic effusions confined by false membranes, or even by enlargement of the left lobe of the liver. It is only in the ascertained absence of such diseased conditions that the extent of dulness on percussion may be taken as the measure of the heart's size.

766. On the other hand, the absence of dulness on percussion does not afford certain evidence of non-enlargement of the heart, as surrounding parts may give an unusually clear sound, and thus mask the heart-affection. Emphysema of the lung, pneumothorax, or even distension of the stomach with gas, may give rise to such a clear sound on percussion. The dulness also ceases, even in healthy persons, on lying down, or on taking a deep inspiration. The persistence of a dull sound under these circumstances affords evidence either of adhesions of the heart or lungs, or of such an enlargement of the heart, or distension of the pericardium, as prevents the heart from receding.

767. *Motions of the Heart.*—The auricles and ventricles contract alternately, the systole of the one being synchronous with the diastole of the other. The auricles first contract, then the ventricles. The contraction of the ventricles is followed by their diastole, and this by a short pause. During the diastole of the ventricles, and the short pause which succeeds, the blood flows from the auricles into the ventricles, and the contraction of the auricular appendices which immediately succeeds the pause excites the ventricles to new contraction.

768. The order, therefore, of the heart's movements is as follows:—systole of ventricles, diastole of ventricles, systole of auricles, pause. This order of succession is called the *rhythm* of the heart's motions. Of the *whole* time consumed, the systole of the auricles and the systole of the ventricles occupies one-half, the diastole of the ventricles a fourth, and the pause a fourth.

769. The *impulse* of the heart is synchronous with the contraction of the ventricles and the pulse in the large arteries. It was formerly attributed to the tilting of the apex of the heart against the ribs, but it is now understood to depend on the sudden change of shape accompanied by rigidity which the heart undergoes—this change consisting of a bulging of its anterior surface through its entire length. The effect of this sudden bulging of the rigid parietes of the ventricles is felt chiefly at the apex, because a thick mass of spongy lung absorbs and neutralises the force of the impulse over the rest of the heart's surface. A full expiration, by diminishing the size of the intervening portion of lung, extends the limits of the impulse, and the same result follows when the body is bent forward.

770. The strength of the impulse, and the extent of surface over which it is felt, vary greatly in disease. When the walls of the heart are thickened at the expense of the cavities (concentric hypertrophy), the impulse is little increased in extent, but greatly augmented in force; but when the walls are thin and the cavities enlarged, the impulse is of less force, but of greater extent. If thickening of the walls is accompanied by increase of the size of the cavities (in which case the heart will be greatly enlarged), the impulse is both stronger and more extensive, and may become perceptible over a space of five or six square inches.

771. Fluid in the pericardium renders the impulse indistinct, and the place in which it is felt variable. Adhesions between the heart and pericardium, on the contrary, confine the impulse to the same spot, so that change of posture, and the different states of the parietes of the chest in inspiration and expiration, have little or no effect upon it. Tumours formed within the chest and various diseases of the lungs may displace the heart, and cause the spot in which its impulse is felt to vary. Congenital transposition of the heart will have the same effect. The impulse will be more distinctly felt, *cæteris paribus*, when the contraction of the ventricle is abrupt.

772. When the heart beats strongly, and especially in emaciated subjects, its movements may be seen as well as felt, and their force, extent, and nature furnish useful indications. When the heart is enlarged, these movements may be distinctly perceived in the epigastric region.

773. The heart is also subject to various irregularities in its action; such as double and triple impulse, depending generally on spasmodic and partial contraction of the ventricles, and on irregular transmission of blood from the auricles; to intermittence, inequality, and increased or diminished force. As these irregular actions of the heart produce appreciable changes in the pulse, they will be considered under that head.

774. *Sounds of the Heart.*—The natural sounds of the heart are two in number—a dull, prolonged sound, synchronous with the heart's impulse, and consequently with the contraction of the ventricles and the pulse in the larger arteries, and an abrupt, clear sound. The second sound immediately succeeds the first, and is followed by an interval of silence. The first sound is loudest over the middle of the ventricles, the last over the site of the semilunar valves, and for a short distance upwards along the sternum. They are best distinguished when the pulse is slow, and are more clear in emaciated than in stout persons. We may hear them in our own persons when lying down, especially on the left side; and in disease they can sometimes be heard even at a short distance from the patient. The intensity of the sound diminishes as the distance from the præcordia increases.

775. In stout persons, the sounds are limited to the region of the heart itself; in narrow-chested persons, and in children, they may be heard all over the chest, before as well as behind. Any cause which increases the conducting power of the contents of the chest extends the limits within which the sounds are audible. Thus when the lungs are consolidated, as in pneumonia, phthisis, &c., the sounds of the heart are heard much beyond their usual limit. Should consolidation be confined to the right side, the sounds of the heart would be heard more distinctly on that side, both before and behind, than on the left.

776. *Cause of the Sounds.*—The dull, heavy, prolonged first sound is caused by the contraction of the ventricles and their musculi papil-

lares, producing tension of the cordæ tendineæ and the membranous valves (tricuspid and bicuspid) into which they are inserted. The second sound is produced by the sudden expansion and flapping together of the semilunar valves.

777. The sounds of the heart may be changed in intensity or in kind. An increased loudness of sound is often heard during nervous palpitations, both by the patient himself and by his attendants; it may also be produced by dilatation of the ventricles, accompanied with thinness of their parietes. In the former case, the impulse is at the same time increased; in the latter, diminished. On the other hand, the sounds may become so feeble as to be heard with difficulty; as is the case in general debility, or in debility of the heart itself, in obstructed pulmonary circulation, in cases where the heart is overloaded with blood, in softening of its fibres, and in excessive hypertrophy. In the latter case, there will be a strong impulse with weak sounds.

778. In cases of nervous palpitation, and after violent exercise, both sounds of the heart are unusually distinct, the action of the muscular fibres being strong and abrupt, and the elastic reaction of the aorta closing the valves with a sudden jerk: hence the loudness of the first sound and the peculiar abruptness of the second.

779. But besides these differences in degree, there are other sounds present in certain unusual or diseased conditions of the circulation. Some of these belong to the heart, and others to the blood-vessels. They are the following:—The *bellows sound* (bruit de soufflet), the *simple blowing sound*, the *hissing sound*, the *sawing sound* (bruit de scie), the *rasping sound* (bruit de râpe), a *humming sound* (bruit de diable), a *buzzing sound* (bruit de mouche), a *whizzing sound*, and peculiar musical sounds, such as cooing, whistling, &c.

780. The sounds heard over the region of the heart itself, or in the large vessels which spring from it, are chiefly the bellows sound and its modifications—the sawing or rasping sound, and the several musical sounds.

781. The *bellows sound* is always produced when there is a marked disproportion between the force of the heart's contractions and the size of the tubes or orifices through which the blood has to pass. It may arise—1. in persons in perfect health, during very violent contraction of the heart, the arteries retaining their normal size; in nervous persons, during violent palpitations, the heart contracting both quickly and forcibly; in chlorotic females, arising, as it is thought, from a thin condition of the blood; and in cases of great debility from sudden hæmorrhage. In these cases the sound is not constant. When present, it bears a close resemblance to the panting noise of a locomotive, as it starts on its journey. 2. From narrowing of the orifices, the heart contracting with its usual force, or with increased violence: as where the orifice of the aorta or pulmonary artery is contracted, with or without enlargement and hypertrophy of the corresponding ventricle.

*bellows sound due to propulsion of blood rapidly, there a small orifice
other there be a small orifice where there should normally be none
the sound is a small orifice where there should normally be none
the sound is a small orifice where there should normally be none*

3. From narrowing of the orifices by vegetations and incrustations on the valves. 4. From polypous concretions formed during life. 5. From adhesion of the aortic or auriculo-ventricular valves to the adjacent parietes.

782. The young stethoscopist must be guarded against confounding a rapid tubular respiration with a *bruit de soufflet*. If there should be any doubt as to the true cause of the sound, the patient must be made to hold his breath.

783. Most of these cases resolve themselves into a disproportion between the force of the heart's beat and the size of the orifices, or into some obstacle to the flow of blood. The place in which they are heard, and the sound of the heart which they accompany, will often enable us to fix upon the precise seat and cause. Thus, sounds heard only in the region of the heart or over the valves, and becoming indistinct when the ear is made to follow the course of the aorta, but increasing in distinctness as the ear approaches the apex of the heart, may be ascribed to disease of the auriculo-ventricular valves; or to causes external to the heart itself, and having the pericardium for their seat. On the other hand, sounds heard in the site of the valves, and remaining equally distinct or increasing in distinctness, as the ear follows the course of the large vessels, may be referred to diseases of the coats, or of the semilunar valves of the aorta or pulmonary artery. Of the two auriculo-ventricular valves, the mitral valve is the most likely seat of disease. Of the two arteries and their valves, the coats and valves of the aorta are much the more liable to alterations of structure.

784. If the abnormal sounds accompany the first beat of the heart, they are probably due to disease of the auriculo-ventricular orifices, of the valves of the arteries, or of the coats of the arteries themselves. When they accompany the second sound, they are most likely to arise from disease of the aortic valves. If heard with both sounds, they may be due to disease of the auriculo-ventricular valves combined with disease of the valves of the aorta or pulmonary artery; or to disease of the coats of the aorta with that of its valves.

785. A more minute diagnosis of the causes of abnormal valvular sounds may be arrived at by considering the position of the valves in connexion with the direction in which the sounds due to them are most readily conducted. In the case of the tricuspid valve, it is natural to expect that the valvular sound would be conducted by the walls of the right ventricle, so as to be most distinctly perceived on the right side, and towards the base of the heart, while abnormal sounds due to disease of the mitral valve will be most distinctly heard on the left side, and towards the apex of the heart. So also with abnormal sounds due to disease of the two great arteries. As their coats will be the best conductors of the sounds produced at the roots of the arteries themselves, or in any part of their course, the sounds will continue distinctly audible along the track of the respective vessels, but become

unmistakable if the cause (and one) of functional murmurs? If so it should be at least not easily mistaken

less and less distinct as the ear is made to travel in a direction from the base to the apex of the heart. Aortic murmurs, therefore, will continue distinct behind the middle of the sternum, and in the direction of the right sub-clavicular space, while abnormal sounds due to disease of the coats or valves of the pulmonary artery, becoming indistinct in that direction, will be best heard at the left of the sternum, between the second and third ribs, and will continue distinct in the track of the left pulmonary artery, or for a short distance in the direction of the left sub-clavicular space.

786. The following diagnosis of valvular sounds is in accordance with these statements.

1. A murmur with the *first* sound of the heart heard over the site of the semilunar valves, and distinct at *c* (Fig. 42, p. 182), is *aortic*.

2. A murmur with the *first* sound heard in the same situation, but distinct at *d*, is *pulmonic*.

3. A prolonged murmur with the *second* sound, loudest over the site of the semilunar valves, is due to regurgitation through the semilunar valves,—of the aorta, if the sound is loudest in the direction *c e*; of the pulmonary artery, if it is loudest in the direction *d f*; but in either case becoming less intense, as the ear is made to travel from the base towards the apex of the heart.

4. A murmur with the *first* sound, loudest at *f*, is from tricuspid regurgitation.

5. A murmur with the *first* sound, loudest at *e*, is from mitral regurgitation.

6. A murmur with the *second* sound, loudest at *e*, is from contraction of the mitral valve; if loudest at *f*, it is from contraction of the tricuspid.

Lastly, as a general rule, a murmur with either sound distinct at *c* and *d* is semilunar; if distinct at *e* and *f*, it is auricular.

787. The indication afforded by abnormal sounds heard over the heart and large vessels may often be confirmed or corrected by placing the hand upon the wrist, at the same time that the ear is applied to the seat of the abnormal sounds. In the case of abnormal sounds attributed to disease of the auriculo-ventricular valves, if the sound precede the pulse, we may attribute it to the entry of the blood into the ventricle; if it is synchronous with it, to reflux. In this latter case, the presence of the venous pulse, that is to say, the pulsation of the large veins on the right side of the neck, caused by regurgitation of the blood into them, indicates that the right side of the heart is the seat of the disease. Confirmation or correction of the indications thus obtained may also be derived from certain leading symptoms, such as the pulse and respiration, and the presence of hæmorrhages and dropsical effusions. For instance, an irregular, unequal, and feeble pulse is common in disease of the mitral valve, but a full, hard, regular, thrilling pulse in disease of the aorta. Dropsies are more common in disease of the right side of the heart, affections of the lungs in disease of the left side, and head symptoms in disease of the aorta.

788. The sounds heard in the locality of the heart, from causes external to it, are superficial friction sounds, generally double, and in rare cases triple or fourfold. They arise from depositions of coagulable lymph on the surface of the pericardium, or from other morbid formations in the same situation. These sounds are of limited extent, and are not heard in the course of the large vessels. They resemble those produced by depositions of lymph on the surface of the pleura, and vary in intensity, from a sound closely allied to the *bruit de soufflet*, to the harsh sound produced by sawing wood.

789. In cases of abnormal sound, the hand applied over the spot where the sound is heard, perceives a peculiar *thrilling vibratory motion*, resembling that felt on touching the back of a cat in the act of purring. This is called the purring tremor (*frémissement cataire*); a similar thrill is sometimes felt under strong pressure in the healthy arteries themselves, after profuse loss of blood, and in anæmia. It is also present over aneurismal tumours, in aortic dilatations, in arterial varix, and in valvular disease admitting of regurgitation.

790. The most common sound in the blood-vessels remote from the heart is the bellows murmur. This may always be produced both in the arteries and veins by the firm pressure of the stethoscope, but is most distinctly heard in chlorotic females, and after hæmorrhages. It is heard in the veins of the uterus during pregnancy, but may be produced by pressure of the stethoscope transmitted to the iliac veins, or aorta.

791. The humming sound (*bruit de diable*) and the buzzing sound (*bruit de mouche*) are also heard in different states of the vessels, and may be produced in the large veins by the pressure of the stethoscope. They may be heard in most anæmic females by placing the stethoscope with a tolerably firm pressure in the supra-clavicular space; but they are not peculiar to anæmia. They are generally most distinct on the left side, but, in rare instances, they are perceptible only on the right side or only on the left.

792. This humming or buzzing sound is distinguished from sounds due to the motion of the blood in the arteries by being continuous. Sometimes, as in extreme cases of anæmia, a humming sound, due to the motion of the blood through the veins, is heard at the same time with a bellows sound caused by the motion of the blood through the arteries. This combination is best heard above the clavicles.

793. Other sounds heard in the blood-vessels are the peculiar whizzing or grating sound of aneurism, and a similar sound from the passage of blood through an accidental opening from an artery into a vein (aneurismal varix).

4. THE PULSE.

794. By the ear, or by the hand applied to the region of the heart, we may count the number, the force, the quickness, the regularity, and the degree of equality of its beats; but the pulse teaches us this

and something more. It is a measure not only of the number, force, quickness, regularity, and degree of equality of the heart's contractions, but also of the quantity of blood sent forth at each beat. Hence it is a better measure of the circulation. It would be a perfect one were it not that the coats of the arteries vary in their degree of contractility. But this variation, while it impairs the value of the pulse as a measure of the circulation, gives it an additional claim to attention as a criterion of the state of the nervous system; for this it is which modifies the contractility of the arteries.

795. The fallaciousness of the pulse has passed into a proverb, and the proverb has furnished a good excuse for the neglect with which it has been treated. Substitute the word "difficult," for the word "fallacious," and we have a motive for industry instead of an apology for idleness. The pulse can only be fallacious to the extent to which we are ignorant of it; it will always remain difficult even to those who understand it best. The difficulties that attach to the subject are the same which beset every part of the study and practice of medicine, and they spring from the same causes—of which the chief are the original difference in degree existing between all the functions of the human body in health, the variable intensity of the causes of disease, and the numerous combinations of which those causes are susceptible.

796. Some precautions are necessary in examining the pulse, and some directions are required. The first precaution to be observed is, to wait a certain time till the emotions commonly occasioned by the presence of the medical attendant have subsided, for such emotions have a marked effect upon the circulation. The mode in which the pulse is felt is also of some consequence. For the purpose of counting the number of beats a single finger may be used; but in order to observe the more minute changes which it undergoes, the four fingers of the opposite hand should be applied in the course of the radial artery, with a moderately firm and equal pressure. By compressing the artery with the ring or little finger, we can ascertain by the forefinger the degree of compressibility. In infants and very young children, it is often difficult to count the pulse at the wrist, and in these cases the beat of the heart should be preferred. In infants the pulse should, if possible, be counted while they are asleep.

797. Of all the characters of the pulse, its frequency is the one most easily ascertained. This usually corresponds with the number of the heart's contractions; it can never exceed that number, though it may fall short of it. In certain forms of heart disease, the quantity of blood the ventricles receive is so small, that it makes no impression on the mass of the circulating fluid, and the impulse does not reach the radial artery; or the heart contracts without having any blood in it; or some pressure, temporary or permanent, may exist in the course of the artery: in all these cases, the pulse is imperceptible, and we miss some of its beats. In syncope, too, all the beats of the heart are so

feeble that no pulse can be felt at the wrist. These are some of the few exceptions to the rule that the pulse is an accurate measure of the frequency of the heart's contractions.

798. The number of the pulse in health varies with age, sex, and temperament; with posture, time of day, sleep, exercise, food, mental emotions; temperature and density of the air; quantity of blood contained in the system; and the strength and vigour of the frame. The principal information which we possess on this subject is condensed in the following pages:—

799. AGE.—*Infancy*.—The frequency of the pulse is very variable in young infants. Heberden found the number of the pulse in the healthy infant asleep on the day of its birth to be between 130 and 140. According to Quetelet, the numbers immediately after birth, both for males and females, are as follow:—

Maximum, 165; Minimum, 104; Mean, 135; Range, 61.

The following numbers are taken from Billard; the averages are approximations:—

	Max.	Min.	Mean.	Range.
1 to 10 days	180; less than 80 (in 18)	106; more than 100		
1 to 2 months	150;	70	103;	80
1 to 3 months	100;	70	87;	30

Hence it appears that the pulse of the infant at birth, and for some time after, has a variable frequency, and is little to be depended upon as a test of the state of the health.

800. From infancy till towards the middle of life, the pulse progressively diminishes in frequency, to increase again slightly in the decline of life. The following table, founded upon between 600 and 700 observations, of which the greater number were made by myself, shows the average and extreme numbers of the pulse, without distinction of sex, time of the day, or posture of the body. The number of observations at each age was either 20 or 25:—

Age.	Max.	Min.	Mean.	Range.
1	158	108	128	50
2	136	84	107	52
3	124	84	106	40
4	124	80	105	44
5	133	80	101	53
6	124	70	95	54
7	128	72	90	56
8	112	72	92	40
9	114	65	87	49
10	120	76	91	44
11	100	56	84	44
12	120	70	94	50
13	112	70	84	42
14	114	68	86	46

Age.	Max.	Min.	Mean.	Range.
15	112	60	84	52
16	104	66	83	38
17	102	54	76	48
18	104	58	74	46
19	108	60	76	48
20	106	52	72	54
21	99	59	74	40
22	96	41	68	55
23	100	60	74	40
24	84	52	71	32
25	88	59	73	29

801. The following table presents the number of the pulse at different ages, deduced from an average of twenty-five observations at each age specified. All the observations were made in apparently healthy persons, fasting, in a state of rest, in the middle of the day, and in a sitting posture:—

AGE.	MALES.				FEMALES.			
	Max.	Min.	Mean.	Range.	Max.	Min.	Mean.	Range.
1 week,	160	104	128	56	160	104	128	56
2 to 7 years	128	72	97	56	128	70	98	58
7—14	108	70	84	38	120	70	94	50
14—21	108	60	76	48	124	56	82	68
21—28	100	53	73	47	114	54	80	60
28—35	92	56	70	36	94	62	78	32
35—42	90	48	68	42	100	56	78	44
42—49	96	50	70	46	106	64	77	42
49—56	92	46	67	46	96	64	76	32
56—63	84	56	68	28	108	60	77	48
63—70	96	54	70	42	100	52	78	48
70—77	94	54	67	40	104	54	81	50
77—84	97	50	71	47	105	64	82	41

802. The pulse of the adult male, then, may be stated at 70, that of the adult female at 80; the highest number is somewhat less than 100 in the adult male, and somewhat more than 110 in the adult female; the least number in each is about 50. The range (the difference between the highest and lowest numbers) extends from 28 to 56 in the male, average 43; and from 32 to 68 in the female, average 46. The lowest number recorded in the table is 46; the lowest observed by Floyer, was 55.

803. Much lower frequencies have, however, been met with in healthy persons. Heberden records 42, 30, and even 26 beats in a man whose 'chief distemper' was the age of fourscore; Fordyce, 26, in an old

man in the Charter-house; in a young man whose pulse is not included in the table, as he laboured under slight dyspepsia, I have repeatedly counted as low as 38 beats; and in the case of a medical man who had been reduced to extreme weakness by a succession of exhausting maladies, and slowly recovered his strength and health, I have counted as few as 30 beats; which, or a near approach to it, continues to be the usual number of beats at an interval of some years from the date of his recovery. Pulses as low as 16 or even 14 beats are on record, but it is doubtful whether the persons in whom they occurred were healthy. Falconer has observed pulses of very low frequency in women, viz., one of 36 and another of 24; and Dr. Graves mentions one of 38.

804. In disease, extraordinarily slow pulses have been observed: one case is reported by M. Piorry, in which it beat 17 times in a minute; in a case of epilepsy, by Sir W. Burnett, the number was 14; Heberden was told of a pulse of 12 or 16 in a minute; and in a remarkable case of injury to the upper part of the spine, followed after an interval by fits of syncope with convulsions, the pulse was usually about 33, but fell during the fits to 12, 10, 8, "and at three or four different times, when the patient was quite insensible, and not in a fit," seven and a-half in a minute. (Mr. Holberton, in *Med.-Chir. Trans.* 1841.) These low frequencies of the pulse are generally little affected by stimuli, and, as in the case reported by Dr. Graves, remain unaltered by febrile attacks.

The pulse often falls to a very low number during convalescence from fevers and other exhausting maladies; and a very infrequent pulse has been specially noted among the anomalous symptoms of diphtheria.

805. It is very probable, on the other hand, that exceptions may exist of an opposite kind—that is, cases of great frequency of pulse; but I have not met with any well-authenticated instances. In disease, very high numbers have been encountered. Dr. Joy has counted 200 in a case of acute hydrocephalus, and I was informed by a medical man, that during occasional violent fits of palpitation he counted in his own person 250 beats in the minute, and that a medical friend who saw him in the fits corroborated his statement as to the number. Heberden counted a pulse of 180, though Floyer thought that the greatest number which could be distinctly counted was 140. I have myself counted upwards of 170 in pulmonary consumption; and during the rapid formation of a diffused abscess of the arm, in a boy ten years of age suffering from a fatal attack of typhus fever, I distinctly counted 264 beats in the minute, being nearly nine beats in two seconds.

806. *Sex.*—It will be seen by comparing the two columns of the last table, that the pulse of the female has nearly the same frequency as that of the male up to seven years, but that at more advanced periods of life the female pulse is in excess by from 6 to 14 beats, the average excess being 9 beats. The pulse, too, has a greater range in the female than in the male; that is to say, there is a greater difference

between its highest and lowest numbers. This happens in consequence of the female pulse being much more frequent in many instances than the male, whilst in others it falls nearly as low.

807. As it is not easy to bear in mind the number of the pulse in the two sexes for the several periods specified in the tables, the following approximative figures may assist the memory :—

At birth	.	.	.	.	140
Infancy	.	.	.	.	120
Childhood	.	.	.	.	100
Youth	.	.	.	.	90
Adult age	.	.	.	.	75
Old age	.	.	.	.	70
Decrepitude	.	.	.	.	75–80

An addition of about 10 beats will have to be made to the last three lines to give the numbers in the female.

808. *Temperament*.—Nothing is known with certainty of the influence of temperament on the pulse. It is probable that it is more frequent in the sanguine and nervous than in the lymphatic and bilious; but I have counted a pulse of 50 in a youth under 20 years of age, with all the marks of the sanguine temperament.

809. *Posture*.—In the healthy adult male the mean frequency of the pulse in the different postures is as follows :—

Standing, 79 ; sitting, 70 ; lying, 67 ; including all exceptions to the rule.

Standing, 81 ; sitting, 71 ; lying, 66 ; excluding all exceptions to the rule.

In the adult female of the same mean age the numbers are,—

Standing, 89 ; sitting, 82 ; lying, 80 ; including all exceptions to the rule.

Standing, 91 ; sitting, 84 ; lying, 80 ; excluding all exceptions to the rule.

810. The extremes are very remote from these mean numbers. Thus, in the male, the difference between standing and sitting has been observed as high as 26, and as low as 0 ; that between sitting and lying as high as 18, and as low as 0 ; and that between standing and lying as high as 44, and as low as 0. In the female, in like manner, differences scarcely less marked have been observed. Numerous exceptions also exist to the rule that the pulse is more frequent sitting than lying, and standing than sitting. The effect of change of posture on the same frequency of the pulse is nearly twice as great in the male as in the female, and nearly three times as great in adults as in early youth.

811. The effect of change of posture increases with the frequency of the pulse, as is seen in the following tables :—

MALES.

	51-70	71-90	91-110	111-130
Standing	61	81	101	120
Sitting	55	68	82	93
Lying. . . .	52	67	74	81
Difference between standing and lying }	9	14	27	39

FEMALES.

	61-80	81-100	101-120
Standing	71	92	108
Sitting	67	85	97
Lying	63	83	90
Difference between standing and lying }	8	9	18

812. The exceptions to the general rule also decrease as the frequency of the pulse increases, and for the higher frequencies of the pulse entirely disappear. The effect of change of posture on the same frequency of the pulse is greater in the morning than in the evening. When the head is placed lower than the body the pulse falls.

813. The cause of the different frequency of the pulse in different postures is the different amount of muscular contraction required to support the body in those postures.

814. The effect of change of position is much increased by debility ; it is greatly diminished in phthisis pulmonalis. The pulse is said by Dr. Graves to be unaffected by posture in hypertrophy of the heart ; but this statement requires confirmation.

815. *Period of the day.*—The pulse of the healthy male, as a general rule, is more frequent in the morning than in the evening, and diminishes progressively as the day advances. To this rule there are many exceptions in males, and still more in females. The pulse also falls more rapidly and uniformly in the evening than in the morning. It is also a general rule that exciting causes of all kinds act more powerfully in the morning than in the evening.

816. In experiments upon my own person, I found that the effect of the same food on the same frequency of the pulse was, taking one

experiment with another, nearly twice as great, and lasted more than three times as long, in the morning; while in more than one instance the same food which in the morning raised the pulse from 5 to 12 beats, and kept it above its natural number for one or two hours, had no effect whatever in the evening. This fact admits of application to the administration of food and remedies in disease.

817. *Sleep*.—The pulse falls considerably in sleep. Quetelet found a difference of 10 beats in an adult female, the same difference in a girl from three to four years old, and in a boy from four to five years a difference of 16 beats. Sleeplessness excites the circulation.

818. *Exercise*.—Muscular exertion increases the frequency of the pulse more than any other cause. It may raise it to upwards of three times its natural frequency. Change of posture is but a particular case of this. After severe and long-continued exertion, as I have ascertained experimentally, the pulse suffers the same collapse as the other functions, and falls much below its natural number. Passive exercise also excites the pulse.

819. *Food*.—The pulse is little affected by vegetable food, more by animal substances, and most of all by warm drinks. Spirituous liquors and tobacco, even though used habitually, increase the frequency of the pulse. Cold liquids lower it.

820. *Mental emotions*.—These have a marked effect on the pulse, the exciting passions increasing its frequency, the depressing passions lowering it. The apprehension which patients feel in the presence of their physician is well known to excite the pulse, and the caution not to count the pulse till the excitement has ceased is as old as Celsus.

821. *Temperature of the air*.—Cold air lowers the pulse, warm air excites it. When Sir C. Blagden exposed himself for eight minutes in air heated to 260° , the pulse rose to 144, or double its natural number.

822. *Density of the air*.—On the summit of Mont Blanc, De Saussure found the pulses that beat 49, 66, and 72 times respectively at Chamounix, raised to 98, 112, and 100.

823. *Quantity of blood in the system*.—The pulse is more frequent in that degree of plethora which falls short of overloading the heart with blood; its frequency is but little increased where the heart is oppressed. Compression of the arterics raises the pulse by producing the first degree of plethora. A slight decrease in the quantity of blood lowers the frequency of the pulse; a considerable decrease raises it.

824. *Debility*.—In debility without disease the pulse falls, but it rises in extreme debility, or where debility is complicated with irritation.

825. The common causes of increased frequency of pulse in healthy persons, then, are the following:—Muscular exertion, active and passive

exercise, a change from a posture requiring less muscular effort to one requiring more exertion, food (especially warm drinks, spirituous liquors, and tobacco), a high temperature, diminished pressure of the air, extreme debility, sleeplessness, the first degree of plethora, and exciting passions and emotions.

826. The principal causes of diminished frequency, on the other hand, are,—sleep, fatigue (provided it be not carried to excess), continued rest, debility without disease (provided the debility be not extreme), depressing passions, cold applied externally or taken internally, increased atmospheric pressure, a change from the standing to the sitting, or from the sitting to the recumbent posture, and the inverted position of the body.

827. Other characters of the pulse, besides its frequency, deserve notice. The pulse of the healthy male may be described as regular, moderately full, compressible, and rising rather slowly under the finger; that of the female is smaller and quicker in the beat, as is also the pulse of the child. The pulse of persons of a sanguine temperament is full, hard, and quick; that of the lymphatic temperament, slower in the beat. In old age the pulse is often rendered hard by the increased firmness of the arteries.

828. Exceptions also occur in healthy persons to the regularity of the pulse, instances having been observed in which the pulse was irregular or even intermittent in health, and regular in disease, resuming its intermittent character on recovery. Heberden records two cases in which the pulse that was both irregular and unequal in health, became regular during illness. In some persons this irregularity occurs on every slight attack of indigestion, especially where much flatulence is present.

829. The frequency of the pulse, then, though a point of much importance, is not the only one that demands the attention of the practitioner; there are other characters of at least equal value. The following description and explanation of them will be found useful.

830. The impression communicated to the finger by the pulse is compounded (a) of the beat of the heart, (b) of the reaction of theorta and large vessels, (c) of the condition of the coats of the artery itself, (d) of the consistence of the blood, and (e) of the state of theortic valves.

831. (a) The characters of the pulse which depend upon the degree and mode of the heart's contraction are the following:—

Number of the heart's contractions.—Pulse *frequent*, *infrequent*.

Regularity of the heart's contractions.—Pulse *regular*, *irregular*, *intermittent*. (This last term should be applied to an arrest of the heart's action occurring at regular intervals.)

Quantity of blood expelled by the heart. Pulse *large* (full), *small*.

If the quantity at each beat is the same, the pulse is *equal*; if different, *unequal*.

Time occupied by each beat of the heart.—Pulse *slow* (labouring), *quick* (sharp), *very quick* (jerking or bounding).

832. (b) The influence of the elastic reaction of the large arterial trunks on the pulse is shown in cases of dilatation of the aorta with loss of elasticity, and in aneurism. The firm and strong reaction of the healthy elastic coat produces a *steady* pulse; the absence of this reaction occasions the peculiar *thrilling* pulse of aortic disease and of aneurism. The degree of elasticity of the arteries themselves produces the following modifications:—

Elasticity of the arteries increased.—Pulse *hard* (strong, sharp, wiry, incompressible).

Elasticity of the arteries diminished.—Pulse *soft* (weak, yielding, compressible).

Elasticity lost in the large arterial trunks.—Pulse *jerking, thrilling, vibrating*.

833. (c) The character of the pulse is further modified by the degree of contractility of the muscular fibres which the coats of the arteries contain. This condition may be conveniently expressed by the word *tone*. It exists in every degree from the tense state of high nervous excitement or rude robust health, down to the flabby condition of collapse, shock, or extreme debility.

834. (d) The influence which the consistence of the blood has in modifying the pulse is best seen in extreme cases of anæmia, in which an important element of the blood being deficient, the pulse assumes the *thrilling* character which in other instances is due to a loss of elasticity in the great arteries.

835. (e) The state of the aortic valves has a marked effect upon the pulse. In their healthy state they contribute by their prompt closure to keep the arterial system full, and thus conduce to the steady character of the pulse. But when the valves are diseased in such a way as to prevent their closure, and to allow of regurgitation into the left ventricle, each pulse is peculiarly distinct, the wave occasioned by the contraction of the ventricle being felt as if the blood were ‘shot under the finger,’ the vessel in the interval being unusually empty. This pulse is an exaggeration of the *jerking* pulse of anæmia.

836. The foregoing characters of the pulse are rarely, if ever, met with separate, but admit of various combinations, of which the following are the most important:—

Pulse *frequent, large, soft*.—(Compounded of a frequent beat of the heart, a large quantity of blood sent out by each contraction, and an artery wanting in elasticity and tone.) This pulse accompanies the premonitory stage of many febrile and exanthematous diseases, such as scarlatina, quinsey, erysipelas, typhus and enteric fever, the first

stage of pneumonia, &c. It is also present in dilatation of the left ventricle of the heart.

Pulse *frequent, large, hard*.—(Compounded of a frequent beat of the heart, a large quantity of blood sent out at each beat, and an artery full of elasticity and tone.) The pulse of the first degree of plethora and of hypertrophy with dilatation of the heart.

Pulse *rather frequent, large, slow* (labouring).—(Compounded of a rather frequent and a slow beat of the heart, and a large quantity of blood sent out at each contraction.) The pulse of a greater degree of plethora, the heart overloaded with blood.

Pulse *frequent, large, hard, quick*.—(Compounded of a frequent and quick beat, a large circulation of blood, and an artery full of elasticity and tone.) The pulse of inflammatory fever.

Pulse *frequent, large, hard, thrilling*.—(Compounded of a frequent beat of the heart, a large quantity of blood sent out at each beat, the artery at the wrist elastic and full of tone, with a loss of elasticity in the larger arterial trunks.) The characteristic pulse of aneurism and of dilated aorta, without obstruction to the flow of blood.

Pulse *frequent, small, quick*.—(Compounded of a frequent beat of the heart, a quick contraction, and a small quantity of blood sent out at each beat.) This is the characteristic pulse of phthisis in males, and of anæmia in females. In a moderate degree, indeed, it is the character which distinguishes the female pulse, and is present in an exaggerated form in all the less severe disorders of the female. This pulse, with the addition of extreme hardness or tension, is the pulse of hypertrophy with contraction of the heart.

Pulse *unequal and irregular, frequent or infrequent*.—(Compounded of a variable quantity of blood sent out at each contraction, and of contractions performed in unequal times.) As the quantity of blood sent forth by the heart may depend upon one of two causes,—a diminished supply from the auricle, or a want of power in the heart,—this pulse may indicate mitral valve disease, or atrophy or softening of the heart. It may depend, also, on causes which render the supply of blood to the left auricle variable. Hence it occurs in some diseases of the lungs. A similar pulse may occur suddenly as the consequence of the formation of a large polypus in the left ventricle, or as the result of pressure exercised upon the heart by some serous effusion into the pericardium.

Pulse *infrequent, large, hard*.—(Compounded of an infrequent beat of the heart, a full supply of blood, and an artery in a state of elasticity and tone.) A pulse met with in apoplexy before depletion has been practised, in hydrocephalus, in compression of the brain, in narcotism, and in simple hypertrophy of the left ventricle.

Pulse *infrequent, quick*.—(Compounded of an infrequent and a quick beat of the heart.) A pulse sometimes met with in the hysteric female, and in very rare cases of phthisis in the male.

837. These are some of the many combinations of the chief elements, so to speak, of the pulse. They are given partly as examples of the

employment of terms, and partly as hints to those who may wish to follow out the study of the pulse.

838. Taken in combination with other symptoms, the pulse furnishes important indications in all diseases; while in cases of phthisis pulmonalis and diseases of the heart and arteries, it often gives the earliest clue to the existence of an obscure and lurking malady.

839. It must not, however, be supposed that the pulse is free from the uncertainties which attach to all other symptoms of disease. On the contrary, we encounter, from time to time, remarkable exceptions to general rules. There are no characters of the pulse, for instance, more generally present than those just indicated as peculiar to phthisis in men; but among some hundreds of cases conforming to the rule of increased frequency, we now and then meet with a single case in which the number falls short even of the average in health. I have met with a few such cases. In one of them the pulse was only 64 in the erect posture. It may be well to state that the dyspeptic patient referred to at § 803, as having a pulse of 38, died several years afterwards of pulmonary consumption. In other diseases and states of system usually characterised by great frequency of pulse, curious exceptions do occasionally take place. Thus there have been epidemics of continued fever characterised by a very low frequency of pulse; and cases of all the more severe febrile disorders marked by the same curious exceptions to the rule. Thus, Dr. Wells counted a pulse of 58 in a boy eight years of age, suffering from anasarca after scarlatina. Of the striking difference of frequency which may exist in two persons suffering from the same disease, Heberden gives a good illustration. Two young women were ill of the same infectious fever, and the pulse of the one was never above 84, while the pulse of the other was counted as high as 180. Both recovered. The low frequency in the first case was thought to be due to the state of the brain, "which was affected comatously."

840. It should also be understood that the pulse in disease is subject to great variations in the same person, either within short intervals of time, or in states of system in other respects apparently the same. Thus, it is not uncommon in typhus fever to find the pulse varying in a few hours from 40 or 50 beats to 120 or 130; and in a case of phthisis, the pulse, which was 64 in one attack of the disease, was 120 in a second attack, not distinguishable from the first by any other symptom.

Changes in the frequency of the pulse in either direction often afford very important indications in disease. Thus, Heberden remarks, "that before some critical swelling or deposit of matter begins to show itself in fevers, the pulse will be so rapid and indistinct as hardly to admit of being counted," a statement fully confirmed by the case cited in § 805. The same accurate observer tells us that if in an illness a pulse of feverish quickness all at once becomes quiet while all the other bad signs are aggravated, we are to suspect a transition of the diseased

condition to the brain, and to apprehend apoplexy, palsy, or death; and, again, that if the pulse of a child be 15 or 20 below the healthy standard, with signs of considerable illness, the brain is certainly affected.

841. Besides the simple characters of the pulse already mentioned, others of less frequent occurrence, and of more obscure nature, have been mentioned by authors, of which the following are examples:—The redoubled pulses (*dicrotus*, *bisferiens*, *bisiliens*), when two strokes follow each other rapidly, and are separated from the two succeeding beats by a pause—a pulse which is said to indicate approaching hæmorrhage; the *incident* pulse (*incidens*, *inciduus*), when the second pulsation is weaker than the first, the third than the fourth, after which there is a stroke as strong as the first, and so on: this is the critical pulse of the old writers; the *pulsus caprisans*, admirably named, but rarely felt; it consists in a small pulse, succeeded after a short interval by a large one, conveying the impression of an unsuccessful effort, followed by the overcoming of an obstacle.

5. THE RESPIRATION.

842. The number and character of the respiratory movements, and the relation which they bear to the state of the circulation, frequently engage our attention at the bedside. In order to appreciate rightly the value of this sign of disease, it is necessary to bear in mind that the muscles of respiration are under the control both of voluntary and involuntary nerves, and that their subordination to the will renders them liable to all those affections of the voluntary muscles in which volition is suspended or impeded. Hence they are affected in hysteria, in chorea, and in tetanus.

843. As the muscles of respiration are subject to the influence of the will, it is necessary, in experimenting on the number and character of the respirations, to avoid this source of fallacy. I have accomplished this purpose by using an instrument which registers the number of respirations during a considerable interval, without requiring any attention on the part of the experimenter. (See § 707.)

844. At the bedside, the same object may be secured by placing the hand of the patient on the abdomen as if with a view of counting the pulse. By relaxing the grasp upon the wrist, and allowing the hand to rise and fall with the movements of the abdomen, the number of respirations may be counted. In this manner the interference of the will, always called into play when the attention of the patient is attracted to the breathing, is avoided. By this means, too, the pulse and respiration may be counted in succession, and compared with each other. This precaution of holding the wrist while the breathing is being counted should be observed even when the respirations are audible, and we are counting them by the ear.

845. *Number of the Respirations.*—This is subject to at least as

much variety as that of the pulse, and has been still less inquired into. Little is hitherto known on the subject beyond a few rude estimates. The number of respirations in a minute is usually stated at 18, or about one to every four beats of the pulse. It is variously stated by authors for the adult male at from 14 to 26 respirations in a minute.

846. The respiration, like the pulse, varies in frequency with age, sex, posture, and time of day—with exercise, rest, and sleep.

847. *Age and Sex.*—Quetelet has made some interesting observations on the respiration at different ages in males and females. The following are the results which he obtained from about three hundred observations on males, and a smaller number on females:—

AGE.	Number of the Respirations.	
	MALE.	FEMALE.
At birth	23 to 70	27 to 68
5 years	32	..
15—20	16 to 24	19
20—25	14 to 24	17
25—30	15 to 21	..
30—50	11 to 23	19

848. The range of my own respiration, from my twenty-eighth to my thirtieth year, as founded upon numerous experiments, with the self-registering instrument, in different postures and under different circumstances, was 12 to 22.

849. Vierordt obtained, as the result of observations on his own person, in the *sitting* posture, a maximum of 15, a minimum of 9, and an average of 12. Hutchinson, in experiments on 1,714 healthy males in the same posture, found a minimum of 6 respirations, and a maximum of 41; while the greater number were found to breathe 20 times in the minute, and a very considerable proportion between 16 and 24 times. It is probable that the highest numbers observed in Dr. Hutchinson's experiments occurred in men who had recently taken exercise. The lowest numbers are of very rare occurrence, and may perhaps be explained by the difficulty of counting the respiration accurately in any posture except the recumbent, and by any means except the pressure of the hand on the abdomen. The recorded frequency of respiration in the persons of the principal experimenters on that function ranges between 14 and 27.

850. *Posture.*—The results of a large number of observations, made on my own person, by the self-registering instrument already referred to, were as follows:—For a pulse of 64 the respirations were, standing, 22; sitting, 19; and lying, 13. Hence the rule which the pulse follows—viz., that the difference between standing and sitting is greater than that between standing and lying—is inverted in the case

of the respiration. The respiration in the sitting posture, for different frequencies of pulse ranged from 15 to 21.

851. *Period of the day.*—The rule of the pulse is also inverted in respect to the influence of the time of day; for whereas the pulse becomes less frequent as the day advances, the respiration becomes more frequent. For the same frequency of pulse, I find that there are about 18 respirations in the evening for 17 in the morning. The same rule obtains in disease in both sexes, even in those cases where the pulse becomes more frequent in the evening. That degree of debility, therefore, which fatigue occasions, both in health and disease, is accompanied by increased frequency of respiration.

852. *Sleep.*—Quetelet has examined the effect of sleep on the respiration. In a woman in her twenty-seventh year he found the respirations to be, awake, 27; asleep, 21. In two young children the differences were 5 and 8 respectively. It appears from his experiments, that the respiration is more affected by sleep than the pulse.

853. The other causes which in health affect the frequency of the pulse, produce the same, or a similar effect, on the respiration. Thus, all causes which increase the frequency of the pulse and the force of the circulation, augment the number of the respirations. On the other hand, all causes of diminished frequency of pulse also lower the respiration. Thus, exercise increases the number of respirations, rest diminishes them: high temperatures increase the frequency both of the pulse and breathing, cold diminishes the frequency of both. Sleep, which lowers the pulse, has a still more marked effect upon the respiration. The only exception to the rule with which I am acquainted, is that of debility. It has been already stated, that debility without disease, provided it be not extreme, is accompanied by an infrequent pulse; the number of respirations, on the contrary, is increased in every degree of debility.

854. *Proportion which the respiration bears to the pulse.*—This has been variously estimated by authors. Quetelet, Burdach, Hutchinson, and the majority of physiologists, estimate the number at 1 to 4; Joy (Lib. Pr. Med.) and Dr. C. Hooker (Boston Med. and Surg. Journal, 1838) at 1 to $4\frac{1}{2}$; Floyer at 1 to 5. No dependence can be placed on these estimates, as they were formed in ignorance of the effect of posture on the breathing. In experiments on my own person, made with the self-registering instrument, the proportion has varied between 1 to 2.60 and 1 to 5.23; and in the sitting posture from 1 to 2.61 to 1 to 5.00.

The chief causes of this difference are the posture of the body, the time of the day, and the frequency of the pulse itself.

855. *Posture.*—For a pulse of 64, the proportion of the respiration to the pulse, standing, was 1 to 2.95; sitting, 1 to 3.35; and lying, 1 to 4.97.

856. *Time of day.*—The proportions morning and evening for the same frequency of the pulse are about 1 to 3.60 and 1 to 3.40.

857. *Frequency of the pulse.*—The ratio of the respiration to the pulse decreases as the pulse increases. Thus for a pulse of 54, the ratio was 1 to 3; for a pulse of 72, it was 1 to 4. As a general rule, the number of respirations increases with that of the pulse, but in a less rapid ratio, the proportion which the respiration bears to the pulse decreasing as the pulse increases. Further observations may slightly modify these statements, founded upon my own observations, but it is believed that they will be found in the main correct.

858. In disease, the number of the respirations varies within much wider limits than that of the pulse. The smallest number which I have counted is 6 in a female in a deep sleep, but not comatose, after attempting suicide by laudanum; and I have counted as few as 10 respirations in a case of paralysis. On the other hand, I have reckoned as many as 44 in a case of phthisis, 73 in a case of paralysis agitans, and 140 in a case of hysteric asthma. Floyer met with 60 respirations in a case of suffocative catarrh, and in a case of inflammation of the lungs in a child: on the other hand, he counted as few as 7 in more than one attack of asthma. Dr. Graves has recorded as small a number as 12, and as many as 50, in cases of fever. In Dr. Hutchinson's table (*Medico-Chirurgical Transactions*, vol. xxix., p. 226), among 1,714 observations on healthy adults in the sitting posture, one is recorded in which there were only 6 respirations in a minute!

859. With regard to the proportion which the respiration bears to the pulse in disease;—Floyer found it as high as 1 to 2 in a case of suffocative catarrh, and as low as 1 to 14 in a case of asthma; Dr. Graves has observed as high a proportion as 1 to 2 in one case of fever, and as low a proportion as 1 to 20 in another. In the case of paralysis agitans already referred to, I counted a pulse of 72 and 73 respirations; in the case of hysteric asthma, 144 pulses and 140 respirations; in a case of transposition of the heart, 32 respirations to 46 pulses; and in a case of paralysis, 1 respiration to $6\frac{1}{2}$ pulses. In a case of aneurism of the heart reported by Mr. Peacock (*Prov. Med. Jour.*, No. 4, vol. ii.), there were 34 respirations to 33 pulses.

860. These remarkable variations in the number of the respirations as compared with that of the pulse are readily explained, if we reflect that the respiration is influenced by many other causes besides the quantity of blood sent to the lungs by the heart. Some of these causes are internal and some external. The principal internal causes are the state of the lungs themselves, and of the investing membrane. Among external causes are mechanical obstructions to the entrance of air, as by the pressure of tumours upon the air-passages, constriction of the chest, increased or diminished action of the muscles of respiration, &c. All these obstructions to the free play of the lungs accelerate the breathing; and this acceleration, whether accompanied by a feeling of uneasiness or not, has been called dyspnoea. As this is the principal symptom of all diseases of the lungs, and a concomitant

of a great majority of diseases of the heart, it will be useful to present the chief causes of it in a tabular form.*

CAUSES OF INCREASED FREQUENCY OF RESPIRATION, OR DYSPNŒA.

I. Quantity of blood in the lungs increased.

- | | | |
|---|---|--|
| a. With quickened circulation. | { | Exercise, repletion, plethora (1st degree), inflammatory fevers, hypertrophy of the right side of the heart, &c. |
| b. With obstacle to the return of blood to the heart. | | Diseases of the mitral valve, pressure on the pulmonary veins, &c. |

II. Quality of the blood altered.

- | | | |
|-----------------------------|---|----------------------|
| a. More venous than usual. | { | Morbus cœruleus, &c. |
| b. Red particles deficient. | | Anæmia, chlorosis. |

III. Deficiency of oxygen in inspired air.

- | | | |
|-------------------------------------|---|---|
| a. Air pure, but small in quantity. | { | Air rarefied by high temperature, or diminished atmospheric pressure. |
| b. Air defective in quality. | | Non-poisonous gases, as nitrogen and hydrogen. |

IV. Mechanical obstructions.

- | | | | | |
|-----------|---|------------------------------|---|--|
| Internal. | { | a. Of the air tubes. | { | Diminished size of air tubes from thickening of their walls, from pressure, and from accumulations of mucus, as in the death-struggle. |
| | | b. In lungs themselves. | | Congestion, hepatization, œdema, tubercle, &c.; emphysema, dilated bronchi, vomicae, &c. |
| | | c. In pleural sac. | | Hydrothorax and pneumothorax, pleuritic affections and adhesions. |
| | | d. Caused by other organs. | | Enlargement of the heart or large vessels, aneurismal tumours. |
| External. | { | a. In parietes of the chest. | { | Malformations and distortions, ossification of cartilages, &c. |
| | | b. In abdomen. | | Enlarged viscera, tumours or dropsical effusions. |

V. State of the muscles of respiration.

- | | | | | |
|--|---|---|---|---|
| a. Paralysis (partial). | { | Injuries of the spinal marrow, in the neck, &c. | | |
| b. Debility. | | From fatigue, from exhaustion, after severe febrile affections, and at the approach of death. | | |
| c. Pain | { | 1. In muscles. | { | In intercostals, diaphragm, or abdominal muscles, the sound muscles performing the respiratory movements. |
| | | 2. In surrounding parts. | | In the abdomen in peritonitis, and in the chest in pleuritis, the muscles which cause the least pain acting alone |
| d. Spasm. | { | Tetanus, hydrophobia, &c. | | |
| e. Other forms of augmented innervation. | | Strong mental emotions: hysteria, asthma. | | |

* A similar table is given by Dr. Williams in Lib. Pr. Med. vol. iii. p. 25. Some use has been made of it in forming this scheme.

861. The chief causes of diminished frequency of the respiration are sleep and coma, however produced, whether by narcotics or by pressure on the brain. The respiration, therefore, is infrequent in apoplexy, and in poisoning by opium and carbonic acid.

862. Many other characters of the respiration, besides increased frequency, merit attention; as the full or deep, the small or feeble, the equal or unequal; the regular or irregular; the short, quick, and catching; the long, the labouring; the thoracic, the abdominal, and the diaphragmatic.

863. A peculiar state of the respiration, combining apnoea with unequal breathing, is worthy of notice from its observed association with fatty degeneration of the heart. The patient, after remaining in a state of apnoea for a quarter of a minute or more, has a feeble respiration followed by a succession of breathings increasing in force up to a maximum of strength, and then as gradually diminishing. This phenomenon has been described by Drs. Cheyne, Stokes, and Sibson.

864. Increased or diminished frequency of respiration taken alone is of comparatively little value; it is only when combined with observations on the pulse, or examinations of the chest by percussion and auscultation, that we learn its real signification. Thus, a frequent respiration, taken alone, may arise from any one of the many causes specified in the table; but a frequent respiration with an infrequent pulse, in the ascertained absence of any disease of the internal organs of the chest, would strongly indicate great debility, or, in the absence of this, hysteria. On the other hand, an infrequent pulse and respiration combined would as probably arise from some disease or injury of the brain or of the upper portion of the spinal marrow. Again, a frequent and quick respiration, in the absence of disease of the internal organs of the chest, and accompanied by acute pain of the parietes of the chest or abdomen, is at once explained by the existence of that pain, whether its seat be in the muscles or in the peritoneum.

865. Important indications may also be obtained by noting the number of respirations day by day in acute diseases. In pneumonia, for instance, a daily diminution in the number of the respirations, with or without a similar change of the pulse, gives the best hope of recovery; in apoplexy or in narcotic poisoning, on the contrary, an increase in the number of respirations, especially if accompanied by an increased frequency of pulse, may be considered as a good symptom. So in convalescence from fever, where there is great debility, a diminished frequency of respiration, with a gradual increase in the number of the pulse, is a sign of returning strength.

866. In making use of these, as well as of the less important symptoms and signs of disease, the observer should always be on his guard against the common error of trusting too implicitly to any one sign, however valuable in itself, to the neglect of others which are capable of affording him useful information. In diseases of the chest, for

instance, neither the stethoscopic signs, nor the respiration, nor the pulse alone, can furnish the practitioner with all the information of which he is in want; but if, knowing the exact value of each of these signs and the fallacies which attach to each, he makes use of all of them at the same time, there are few difficulties in diagnosis which he will not be able to overcome.

6. OTHER SYMPTOMS AND SIGNS OF DISEASE.

867. In addition to the signs and symptoms of disease so minutely examined in the first five divisions of this chapter, there are several others of which it is easier to recognise the importance than to arrange them in a manner free from objection. Some of them, as the expression of the countenance, the appearance of the tongue, and the presence or absence of pain, are subjects of observation and inquiry in every case of disorder or disease without exception; while others, as the appearance of the sputa, or of the discharges from the alimentary canal, are noted only, or chiefly, in diseases of the lungs, or of the primæ viæ. Yet these symptoms of larger import associate themselves very naturally, in many cases, with symptoms of very limited application—*e. g.*, the appearance of the tongue with that of the lips and gums in anæmia; so that it seems reasonable to group them together, and to treat of them in connection with each other. Accordingly, the symptoms and signs which still remain to be examined will be treated in this section under the distinct heads of—1. The organs of digestion. 2. The organs of circulation. 3. The organs of respiration. 4. The urinary and genital organs. 5. The nervous system. 6. The expression of the countenance, and the condition and attitude of the body.

868. (1.) THE ORGANS OF DIGESTION.—The condition of the alimentary canal is revealed to us in part by the state of the tongue; in part by alterations in the functions of the stomach and intestines, such as nausea, vomiting, and purging; and in part by the character of the matters rejected from the stomach and bowels.

869. The value of the *tongue* as a symptom or sign of disease, and an aid in diagnosis and prognosis, will be readily understood if it is borne in mind that it consists of a dense mass of muscular fibre, largely supplied with blood, covered with a secreting membrane, and lying in a bath formed of the secretions of the mouth and salivary glands. It may, therefore, be expected to furnish indications of the state of the muscular and nervous system, of the circulation, of the function of secretion generally, and of the character of the secretions in other parts of the body, and especially of the state of the alimentary canal, to which it may be said to belong by continuity of membranous covering, and as subserving the function of mastication.

870. The tongue does not present the same appearance in all healthy persons. In some it is habitually clean, in others slightly furred; in some florid, in others pale; in some compact and firm, in others flaccid and indented by the teeth; in some it is protruded in a relaxed state,

in others strongly contracted and drawn to a point. Even in the most healthy persons it is covered with a thin white fur in the morning before taking food, and those who sleep with the mouth open awake with a perceptible dryness of the tongue.

871. In disease, the tongue presents a great variety of appearances. As to *size*, it is swollen in inflammation of the organ itself, in severe diseases of the adjacent parts, in salivation from mercury, and in malignant diseases; on the other hand, its size is diminished where much emaciation is present. The swelling of the tongue from any of these causes is accompanied by indentation where it is in contact with the teeth, an appearance which the tongue also wears in that relaxed and flabby state which often accompanies great debility. The *form* of the tongue varies with the mode in which it is protruded; but as a general rule, it is small and pointed in "irritation," broad and flabby in states of debility. The *temperature* of the tongue is low in syncope and apnœa, and, in common with the breath, undergoes a very marked decrease of temperature in epidemic cholera. Its *colour* coincides, to a certain extent, with that of the general surface of the body. Thus it is florid in plethora; pale after profuse discharges of blood, in anæmia, in allied states of system, and in many chronic wasting maladies; and livid in apnœa and in certain diseases of the heart and lungs which greatly affect the respiration. The colour of the tongue also depends upon the state of the digestive organs. Thus it is universally red, or red at the tip or at the edges, or in both situations, in some cases of acute inflammation of the mucons membrane of the stomach and bowels. It is also very red and tender in some forms of fever, in some cases of scarlatina, and in typhus fever, after the disappearance of the fur. A smooth red tongue, sometimes known as a "glazed" tongue, is often present in fever accompanied by great irritation of the stomach and bowels, and in idiopathic affections of those organs. In acute inflammation of the throat, the tongue may also assume a deep-red colour. In poisoning by the mineral acids it is stained of characteristic colours, and its epithelial covering partially or wholly removed.

872. Much importance attaches to the condition of the tongue in respect of *moisture*. As the tongue of a healthy person is kept moist by the secretions of the lining membrane of the mouth, and by the saliva, it becomes dry when those secretions fall short of the quantity requisite to supply the loss by evaporation and that which from time to time passes down the gullet in the act of swallowing. It is obvious, therefore, that the tongue must afford a valuable index of the state of the secreting organs, and of the condition of the circulation, as promoting or retarding the proper functions of these organs. Accordingly a dry tongue will indicate a state of circulation unfavourable to secretion in other organs as well as in the tongue and mouth; and such a tongue exists in inflammatory and febrile states of system. On the other hand, a moist tongue indicates a favourable state of the secretions generally, and an absence of any high degree of inflammation

or fever; and it is obvious that a transition from a dry to a moist tongue must always be a favourable sign. Hence, in cases of fever, the physician carefully inspects the tongue, examines it by the touch, and hails a moisture appearing at the edges, and gradually extending to the centre, as the sign of a freer state of all the secretions, and a mark of approaching convalescence. Again, a moist and flabby tongue, indented by the teeth, is justly regarded as a sign of want of tone and vigour, and an indication of a state of circulation favourable to secretion from other organs as well as from the mouth.

873. A *fur* collects on the tongue in almost all severe diseases. It is covered with a white creamy fur in the first stage of fever, in catarrh, in quinsy, in most severe inflammations, and in acute rheumatism. In more advanced stages of fever, a thick brown or black coating collects, or the tongue is dry, parched, and tender. A thick, black, dry fur, with black *sordes* about the teeth, is seen in the typhous stage of fever, and in low typhous conditions of the system, and coincides with a highly impure state of the blood, with unhealthy secretions, and fetid discharges from the bowels. A brown dry fur exists in cases of local irritation, the tongue becoming moist as the irritation subsides. In jaundice, the fur is sometimes tinged with bile, and in scurvy it is blackened by the effused blood. In dyspepsia, the appearance of the tongue is very variable. Sometimes a thick fur collects at the base of the tongue, while the tip and edges are bright red; sometimes the fur extends over the whole surface, and is accompanied by indentations formed by the teeth, by partial abrasions of the epithelium, and by deep cracks, which are often strongly marked in persons who indulge in ardent spirits to excess. Deep foul ulcers of the tongue, with hard borders, are not uncommon consequences of syphilis. In many cases of constipation the tongue is covered with a brown fur; in others it presents no unusual appearance.

874. A very peculiar and characteristic appearance is presented by the tongue in most cases of scarlatina. The papillæ are elongated and florid, and protrude through a white coating of fur; or, the tongue itself being of a bright-red colour, and free from fur, the papillæ appear distinct on a red ground. In the first case the tongue closely resembles a white, in the second a red, strawberry.

875. In common with the lining membrane of the month and throat, the tongue may be the seat of small superficial ulcers, known as *aphthæ*. These ulcers are of frequent occurrence in infancy, when they constitute the "thrush;" they are also common in the last stage of pulmonary consumption, and less frequent towards the fatal termination of other chronic visceral diseases.

876. The mode in which the tongue is *protruded* is often characteristic. It is tremulous in extreme debility, or under the influence of fear, as also in cases of idiopathic fever with debility. It is protruded with difficulty when dry; slowly and hesitatingly in diseases accompanied by stupor, in which case it is withdrawn after an interval, and

as if in consequence of deliberation. In partial paralysis the tongue is protruded either towards the sound or the affected side of the face.

877. The *gums* afford signs rather of the state of the circulation than of the digestive organs. They are florid in plethora; pale in anæmia; livid when the function of respiration is much impeded; swollen and dark in sea and land scurvy, in which diseases they bleed on the slightest touch; swollen with an inflamed line in cases of salivation; marked with a blue line at the margin of the teeth in poisoning by lead.

878. The *lips* and lining membrane of the mouth, like the gums, inform us as to the state of the circulation. They are pale in anæmia. They are also dry and parched where the tongue is similarly affected. They are the seat of aphthous ulcers in young children, in consumption, and towards the close of febrile and inflammatory affections. An herpetic eruption on the lips is a common and characteristic accompaniment of severe catarrh.

879. The *teeth* afford some useful indications. In early life they attract attention during dentition as the source of much suffering, of severe febrile symptoms, of marked disturbance of the functions of the alimentary canal, of convulsions, and of eruptive diseases. In later life the soundness of the teeth may be looked upon as an indication of vigour, and their early decay as one of the marks of feebleness of constitution. Caries of the teeth may, however, be induced by habitual and severe indigestion, by the excessive use of acids, and by the abuse of mercury. Persons who handle mercury in their trades are also subject to chipping of the teeth. The teeth grow loose in scurvy, and during salivation with mercury. They are covered with dark brown or black sordes in typhoid fever and in typhous states of system. *Grinding* of the teeth during sleep is common in children suffering from worms or other intestinal irritation; and *chattering* of the teeth accompanies the severe shivering fits which usher in many febrile disorders, and form part of the paroxysm of ague.

880. The *fauces and tonsils* are subject to chronic inflammation and swelling, and the *uvula* to relaxation, which may be taken as indications of want of constitutional vigour. The same parts are the seat of inflammation in scarlet fever, diphtheria, and severe attacks of catarrh; and of ulceration in secondary syphilis. The tonsils themselves are liable to intense inflammation and great enlargement in quinsy, and they are the seat of a painful chronic irritation in persons who use the organs of speech unskilfully.

881. *The saliva*.—An increased flow of saliva is a symptom worthy of observation, sometimes as the result of irritation of the salivary glands through inflammation of the mouth and parts adjacent, sometimes as the consequence of dentition in children, and of the irritation set up by unsound teeth in the adult; sometimes, again, as an effect of certain active medicines, such as mercury, iodine, antimony, and their preparations, of prussic acid and digitalis. Mercurial salivation is at-

tended by soreness of the gums, a coppery taste, and a peculiar fœtor, which serve to distinguish it from a mere increase of saliva; also by a febrile disturbance known as the *mercurial erethysm*. An increased flow of saliva from any cause is known as salivation, or ptyalism. Frothing at the mouth, due in part to an increased secretion of saliva, and in part to increased mucous discharge from the air-passages, is a common symptom of epilepsy and hydrophobia. In epilepsy the froth is, as it were, churned out of the mouth by the convulsive movements of the muscles of the tongue, mouth, and lips; while in hydrophobia it is forcibly spit out between the closed teeth. Ptyalism is an annoying accompaniment of pregnancy in some women.

882. *The taste*.—The sense of taste is more or less impaired in all diseases in which the tongue becomes dry or furred. It is also probably impaired in apoplectic seizures. A bitter taste is often present in jaundice, and on waking in the morning in persons suffering from feverish attacks, or from severe dyspepsia; and it may be caused instantaneously by strong mental emotion. Consumptive patients often complain of the salt taste of their sputa, and a putrid taste is present in diseases in and about the mouth attended by decomposition. Some dyspeptic patients also complain of a taste as of rotten eggs; and a coppery taste is one of the signs of mercurial salivation.

883. *The appetite*.—A loss of appetite (anorexia) and distaste for food (nausea) are among the earliest symptoms of indisposition, and the most constant attendants of severe illness; while, on the other hand, a restored appetite is among the earliest indications of convalescence. A failing appetite, again, is an unfavourable symptom in chronic maladies, and in advanced age; but it may be caused in persons not suffering from disease by want of exercise and fresh air, and by depressing passions. A voracious appetite (bulimia) is an occasional result of irritation of the stomach, or of intestinal worms; and it is sometimes a disease of itself, not easily traced to its true cause. It is also often present in children suffering from mesenteric disease, in whom that part of the food which should have nourished the body is prevented from entering the lacteals. A voracious appetite is also a common occurrence during established convalescence, obviously as a means of repairing the wasted body. Intense hunger is one of the after-effects of Indian Hemp. In some cases it is associated with frequent vomiting of food, as in inflammation attacking the stomach near the pylorus. A depraved appetite (pseudorexia) occurs in pregnant females, in chlorosis, and in hysteria, and in some forms of insanity.

884. *Thirst* is a common symptom of disease. It is present in active inflammations, and in violent febrile attacks, in consequence, probably, of the tongue, mouth, and throat partaking of the vascular fulness of the whole system, and suffering from an inconvenient and distressing dryness. It also occurs in accidents and diseases attended by a sudden loss of blood, or a rapid outpouring of some important secretion. Accordingly it is present in profuse hæmorrhages; in

diarrhœa, dysentery, and cholera; in diabetes; in some forms of dropsy; and in cases of phthisis attended with profuse perspiration. In healthy persons it always follows violent exercise, and it is the most urgent suffering of the soldier on the march, and of the wounded on the field of battle. Thirst is also a consequence of the overloading of the blood with saline matters, as in the sailor fed on salt meat, and, in a less degree, in persons who indulge in condiments to excess; and it is a leading symptom of poisoning by arsenic, and by irritant poisons generally. An excessive desire for liquids is known as *polydipsia*.

885. *The odour of the breath*.—The rapidity with which liquids having a strong and peculiar odour, or imbibing such an odour from the food with which they are mixed, pass from the stomach into the circulation, are eliminated by the lungs, and taint the breath, makes the odour of the breath a point of some importance. Thus the odour of spirits sometimes enables the medical man to discriminate between the effects of intemperance and an apoplectic seizure. A foul breath is also among the symptoms of dyspepsia, of that unhealthy condition of body known as *cachexia*, of salivation, of advanced stages of fever, of senility, and generally of inflammations in and about the mouth, attended by decomposition of the secretions; or followed by gangrene of the solid parts. It is accordingly present in gangrene of the mouth, and in caries of the teeth. On the other hand, an extremely offensive state of the breath is sometimes to be traced to the lungs, as in gangrene of those organs. The breath has been observed to have the odour of honey in saccharine diabetes.

886. *Vomiting* as a symptom of disease can only be duly appreciated by bearing in mind that the stomach is not merely the chief organ of digestion, but a viscus in close nervous relation with the brain, heart, and lungs. Vomiting may therefore not merely occur from disorder or disease in the stomach itself, but also in consequence of severe injury or disease of the more important organs of the body, or of shocks affecting the nervous system more especially. Among the causes affecting the stomach and intestinal canal may be mentioned, simple overloading of the stomach; irritating food; inflammation of the mucous membrane of the stomach, by whatever cause produced; obstruction to the passage of the food through the pylorus, as in cancer of the stomach; permanent obstruction to the passage of the feces through the intestines, as in ileus and strangulated hernia; and inflammation of the entire alimentary canal, as in English and Asiatic cholera. Vomiting is also a common effect of poisons belonging to the classes of irritants and narcotico-acids, and sometimes attends poisoning by the pure narcotics, and especially carbonic acid. It is also a common effect of chloroform. To the more indirect and remote causes of vomiting belong concussion of the brain, the condition of the brain preceding an apoplectic seizure, and inflammation of the substance and membranes of the brain. Vomiting, again, accompanies the passage of gallstones, and of renal calculi, and severe inflammation of the heart, and of the womb. It is also of very frequent occurrence in delicate females, and is one of

the most constant symptoms of pregnancy. Lastly, vomiting is often amongst the earliest premonitory symptoms of severe attacks of the febrile exanthemata, and particularly small-pox.

In vomiting dependent on diseases of the stomach and bowels, it is important to note the time after a meal at which the symptom shows itself. As a general rule, vomiting following immediately, or quickly, on the reception of food, is to be attributed to inflammation of the mucous membrane of the stomach itself. If the food is rejected after having remained in the stomach an hour or more, the cause of the vomiting may be traced, with great probability, to the pylorus or duodenum. If the vomited matters do not consist of food, this inference will not hold good. When, instead of a single act of vomiting ushering in an attack of illness, the vomiting recurs again and again, it must be looked upon as an unfavourable complication, except in pregnant women.

887. *Vomited matters*.—We are often assisted in our diagnosis by the examination of the matters rejected from the stomach. In gastritis the food is returned nearly unchanged almost directly it is swallowed; when discharged after an interval more or less considerable, and more or less completely digested, it may be in consequence of ulcer in the stomach, or of malignant disease of that organ. The longest interval occurs in disease of the duodenum, when the food is fully converted into chyme. Clear acid liquids are vomited after an interval of from half an hour to two hours or more in the disease known as gastralgia or gastrodynia. Bile regurgitates from the duodenum, and is discharged by vomiting, in functional and organic diseases of the liver. Blood is often discharged in very large quantities in the disease known as hæmatemesis; generally of a dark colour, clotted, and mixed with food; rarely of a florid hue, as in hæmoptysis. The blood so discharged may flow from the general surface of the stomach, or from one or more ulcers in the mucous membrane; or it may regurgitate through the pylorus from the duodenum. A discharge of a large quantity of florid blood may be the result of an aneurism bursting into the stomach. Vomiting of purulent or muco-purulent matter points to the rupture of an abscess or some neighbouring viscus opening into the stomach. Feculent vomiting is a symptom of mechanical obstruction of the lower portion of the intestinal canal, or of a fistulous communication existing between the stomach or upper portion of the small intestines and the colon. In a highly acid state of the contents of the stomach, a scanty vomiting of mucus, or of a clear acid liquid, abounding in small round black flakes, is a common occurrence. Such vomited matters, when placed under the microscope, are found to contain the vegetable growths described by Goodsir as *Sarcina ventriculi*.—(Fig. 43.)

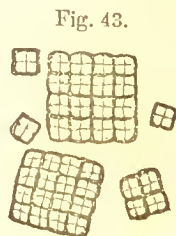


Fig. 43.

888. The *bowels* are variously disordered; sometimes confined, from torpor, from the absence of their natural stimulus, from mechanical obstruction, or from the operation of the poison of lead; sometimes

relaxed, from inflammation of the mucous membrane, whether caused by previous constipation, unwholesome food, purgative medicines, or irritant poisons. Diarrhœa is also a common consequence of ulceration of the intestines in typhoid fever; it is a frequent occurrence in pulmonary consumption, uniformly present in advanced stages of *tabes mesenterica*, very prevalent during the heats of summer, and an occasional consequence of a change of residence from cold to hot climates, and from low situations to elevated ones. Strong mental emotions also sometimes give rise to diarrhœa. In union with vomiting it constitutes English and Asiatic cholera, and is present in almost all cases of irritant poisoning. Frequent and scanty discharges of mucus, pus, or blood, with great tenesmus, constitute the disease known as dysentery.

889. The alvine discharges may consist of mucus, tenacious lymph, or pus, as in inflammations of the mucous membrane of the canal, the nature of the secretion depending on the degree of the inflammation; or they may consist of blood poured out by the vessels of the intestines generally, by those of the large intestines exclusively, or by the enlarged veins of the rectum (*piles*). They may consist chiefly of ill-digested food, which happens in *tabes mesenterica*, or they may contain an unusual quantity of fat, as in disease of the pancreas.

890. The evacuations may be pale from the absence of bile; unusually yellow from its excess; green, as often happens in children; dark and offensive, from the long retention of feculent matter, or from morbid secretions of the liver; dry from long retention, and in detached masses known as *scybalæ*. They assume a light yellow colour under the use of mercurial preparations; mineral acids in large doses impart to them a green colour; and preparations of iron turn them black, as does also the admixture of blood in considerable quantity.

It is important in all doubtful cases to distinguish those discharges which flow from the general surface of the intestines from such as are the product of local disease in the rectum. When, therefore, pus or blood is discharged with the motions, and the symptom is not promptly relieved by proper aperient medicines, the rectum should be examined for piles or fistula, or (if florid blood is poured out in considerable quantity) for a bleeding artery laid bare by ulceration.

891. We may often derive important aid to a sound diagnosis from comparing the discharges from the stomach with those from the bowels. Thus, obstinate constipation with vomiting of feculent matter, implies mechanical obstruction, as in strangulated hernia; while vomiting of feculent matter, accompanied by a discharge of imperfectly digested food (*lientery*), goes far to justify the inference that a fistulous opening exists between the stomach or beginning of the small intestines and the colon (*ileo-colic fistula*).

892. (2.) THE ORGANS OF CIRCULATION.—The most important symptom and sign of disease connected with the circulation is the pulse, which has already been minutely examined in a former division (4) of this chapter; and some indications of the state of the *capillary circula-*

tion have also been considered when speaking of the gums, lips, and lining membrane of the mouth. Similar indications of the state of the circulation through the small vessels, and of the full or empty state of the vessels generally, may be derived from the appearance of the skin, which is pale after severe losses of blood, in anæmia, in leucoeythemia, and in analogous states of system, universally florid in plethora, of a brighter or duskier red, in patches of greater or less extent, in the febrile exauthemata, livid in diseases of the heart and lungs attended with imperfect aëration of the blood, and yellow in jaundice, from the retention in the blood of bile which ought to have been eliminated by the liver. The languid circulation of old age is marked by dark discoloration of the skin of the legs; and habits of intemperance often betray themselves by a permanently mottled state of the skin of the face, with streaks and spots of dark-red on a yellow ground. In a weak state of the system, such as occurs in sea and land scurvy, and in the typhous stage of continued and remittent fevers, the capillary blood-vessels often give way, and the blood is shed into the surrounding tissues. When the effusion is large, it is called an *extravasation*; when it forms small round spots in the skin, these are called *petechiæ*. Extravasations and petechiæ do not disappear on pressure; but the redness due to plethora, inflammation, or congestion, readily disappears on pressure, but quickly returns on its removal.

893. *The veins*, by their distended and swollen state, sometimes supply useful aids to diagnosis. When, for example, the sounds heard on applying the ear or stethoscope to the region of the heart lead us to infer the existence of valvular disease, but leave us in doubt as to the particular valve affected, a visible pulsation in the jugular veins accompanying each beat of the heart indicates regurgitation of the blood through the imperfectly closed *tricuspid* valve. When the swelling of the vein is considerable, and the pulsation very distinct, we have a further indication that the walls of the right ventricle are thickened. In cases of rare occurrence a visible pulsation is communicated to the veins by the transmission of the heart's impulse through the capillary vessels. This is called the venous pulse, and is a sign of an unusually strong action of the heart. This true venous pulse requires to be distinguished from the lifting of a vein by the force of the artery lying beneath it. The veins of the surface of the body sometimes become greatly distended and highly varicose from the closure, by pressure or disease, of some deeper-seated venous trunk.

894. (3.) THE ORGANS OF RESPIRATION.—Though the number of the respirations, and the proportion which they bear to the number of the pulse, as well as the respiratory movements generally, have been examined with great minuteness in a former part (5) of this chapter, several symptoms and signs of disease, due to a disturbance in the functions of the lungs, remain to be considered. Certain respiratory movements, for instance, such as sighing, yawning, sneezing, and coughing, to which may be added the noisy inspiration known as *stertor*,

deserve notice as signs of disease. The changes which the pulmonary secretions undergo in disease, and the odour and temperature of the breath, also claim attention. The signs derived from the altered character of the respiratory movements may be divided into the two heads of *noisy inspiration* and *noisy expiration*.

895. *Noisy inspiration*.—In healthy persons the air is drawn into the chest, and expelled from it noiselessly; but there are diseases which are accompanied and characterised by peculiar inspiratory sounds. The long loud whooping inspiration following the complete emptying of the lungs by a succession of violent expirations, or coughs, is familiar to us as the pathognomic sign of whooping-cough; laryngismus stridulus is recognised by the peculiar *crowing* character of the inspirations; and croup by a similar inspiratory sound compared to the crowing of a cock. Attacks of spasmodic and humoral asthma, again, are marked by the loud wheezing or whistling which accompanies each drawing in of the breath. *Stertor*, *stertorous breathing*, or snoring, is another form of noisy inspiration which owes its origin to the flapping of the soft palate when partially paralysed, as in sound sleep, or completely paralysed, as in congestion of the brain. Accordingly it is present in apoplexy, and in compression and concussion of the brain; and it is one of the group of symptoms known as *coma*. *Sighing* and *yawning* admit of being classed under this head. They are forms of deep and audible inspiration, which, as a general rule, indicate the previous imperfect performance of the function of respiration, such imperfection resulting, in some cases, from a deficient supply of nervous power; in other cases from congestion of the lungs; in others, again, from a slight mechanical impediment to the complete expansion of the chest. As a general rule, sighing is expressive of emotion or intense occupation of the mind, and yawning of bodily fatigue. Yawning is also present in many nervous affections falling short of well-defined disease, and it is a symptom attendant upon the accumulation of urea in the blood. In the congestion of the lungs which follows recovery from asphyxia, after fainting fits, and during hysterical attacks, sighing and yawning are common occurrences. Under the head of mechanical impediments inducing yawning or sighing as supplementary to the ordinary movements of respiration, may be specified the restraint of stays in women, and in either sex the accumulation of flatus in the stomach hindering the downward movements of the diaphragm. Either of these mechanical impediments may bring on hysterical paroxysms in persons predisposed to them. Another form of noisy inspiration is *hiccough*. This is a short inspiratory movement, which affects chiefly the diaphragm. It is nearly allied in character to that common expression of grief, *sobbing*. Hiccough is often experienced to a painful degree in the act of eating, when the food is swallowed hastily. It is also a symptom of inflammation of the diaphragm, or of those viscera, or parts of viscera (such as the liver, pancreas, duodenum, or cardiac extremity of the stomach), which are in contact with it, or lie adjacent to it. It is also frequent in diseases of the kidney. Tumours

pressing upon the pneumo-gastric nerve are sometimes the cause of obstinate hiccough. It accompanies the feculent vomiting of strangulated hernia, and it is frequent towards the termination of many acute maladies, when it must be looked upon in a very unfavourable light.

896. *Noisy expiration*.—Sneezing and coughing are the two forms of noisy expiration deserving of notice as symptoms and signs of disease. *Sneezing* consists of a violent expiration forcing the air through the nostrils, following upon a deep and full inspiration. It either serves to clear the nostrils of some cause of irritation, or it marks the swollen and painful state of the lining membrane which ushers in attacks of catarrh and of measles. It is a symptom of longer continuance in the disease known as hay-asthma. It is also one of the group of symptoms which marks the poisonous action of iodide of potassium. In common with other violent movements of the muscles of respiration, it may occur in hysteria. *Coughing* is a violent expiratory effort by which the air-passages are freed from offending matters, as the nostrils are cleared by the act of sneezing. The contents of the air-tubes thus expelled are said to be *expectorated*, and the act of expulsion is called *expectoration*. The matters themselves are known as *sputa*.

There are many different kinds of *cough*. A cough may be *dry*, or unattended by expectoration; or *moist*, that is to say, accompanied by *sputa*. The dry cough may be due to irritation of the pulmonary branches of the pneumo-gastric nerve, or to the pressure of tumours and morbid growths on some part of the air-passages. Hence a dry ringing cough of long continuance will sometimes indicate the existence of aneurism of the aorta. A dry cough is also present in the early stage of inflammations affecting the air-tubes, when the blood-vessels are in that state of fulness unfavourable to secretion. This happens at the onset of attacks of catarrh, influenza, and croup, and in the first stage of humoral asthma. A dry cough is also one of the results of dyspepsia, of obstinate constipation, and of intestinal worms; and a loud, dry, barking cough is recognised as one of the symptoms of hysteria. The cough in incipient phthisis is either dry or attended with scanty expectoration on rising in the morning or at distant intervals. An inflamed state of the fauces, with enlarged tonsils and relaxed uvula, is another cause of a dry cough. Inflammation or ulceration of the larynx and trachea also gives rise to a troublesome dry cough, or one attended with a very scanty expectoration. When the seat of the disease is the upper part of the larynx, the dry cough is accompanied by a hoarse voice. A short, dry cough, attended with acute pains in the side, is one of the symptoms of pleurisy. When a dry cough comes on in paroxysms, it is called a *spasmodic* cough. Such a cough may be often traced to inflammation of the liver, or to biliary obstruction, or to a diseased state of some viscus situate near the diaphragm. But coughs accompanied by free expectoration, when occurring in paroxysms, are also termed *spasmodic*. A *moist* cough, or a cough accompanied by expectoration, is of more common occurrence than the dry cough. Such a cough is present in

catarrh, in bronchitis, in confirmed phthisis pulmonalis, in whooping-cough, in pneumonia, in gangrene of the lungs, and in hæmoptysis.

897. The *expectoration*, or *sputa*.—The fluids coughed up from the lungs often furnish us with very important information; but that we may interpret them aright, we must bear in mind the fact, that substances spit out, or otherwise rejected from the mouth, may consist of the secretions of the mouth and throat, of the nostrils, or of the lungs, as well as of the secretions and contents of the stomach; and it is not always easy to ascertain, from the descriptions of a patient, from which of these parts the matters submitted to our inspection have been supplied. When, for instance, the fluid consists wholly or chiefly of blood in considerable quantity, it is not always easy to ascertain whether it came from the lungs by an almost imperceptible cough, or from the stomach by an easy act of vomiting; when, on the contrary, the quantity of blood in the sputa is small, it may be equally difficult to determine whether it was hawked from the throat or coughed from the lungs. Young children generally swallow expectorated matters.

898. Having ascertained that the matters submitted to our examination have been coughed up from the lungs, we should have to consider their quantity, both absolutely, and relatively to the time occupied in their discharge, as well as their quality. As a general rule, a continuous and abundant expectoration, especially if coughed up with ease, may be regarded as favourable, as far, at least, as the present state of the patient is concerned. Such an expectoration exists in the moist stage of common colds, in chronic bronchitis, in confirmed phthisis, and in whooping-cough.

899. On the other hand, a scanty expectoration ushers in all acute attacks of disease of the lungs, though it also exists in the first stage of a common cold, and throughout the first or incipient stage of pulmonary consumption. It marks the first onset of a fit of humoral asthma, and the first stage of pneumonia. Again, a transition from a scanty to a more abundant secretion may be looked upon as a favourable symptom, just as the reverse indicates a relapse or increase of disease of the lungs. When a scanty secretion, coughed up with difficulty, is streaked with blood, it may be taken as evidence of great congestion, or active inflammation of the lungs. Again, a copious sputum brought up in one act or fit of coughing has a significance of its own. It shows either a previous accumulation of the discharged matter in some cavity of the lungs, or in some neighbouring viscus, or a very rapid outpouring of the same from a considerable extent of the mucous membrane of the lung itself.

900. The quality or character of the sputa often supplies us with an important aid to diagnosis, and the changes of character which occur in the course of the same illness are especially deserving of attention. The sputa may consist of unmixed mucus of various degrees of consistence (as in catarrh, bronchitis, and pneumonia); of a thin watery mucus (in some cases of early phthisis); of a tenacious, gelatinous mucus,

mottled with small round brown or black spots. and full of air-bubbles (in the stage of humoral asthma immediately following the dry stage); of a stringy tenacious brown or rust-coloured mucus (in the first stage of pneumonia); of mucus tinged or streaked with dark blood (in the acmé of a fit of humoral asthma, in acute pneumonia, and in some cases of phthisis pulmonalis); of mucus bleuded with pus (in fully developed catarrh, in bronchitis, and in confirmed phthisis). Again, the expectorated matters may be wholly or chiefly *purulent*, the pus consisting of the contents of a cavity suddenly or gradually discharged; or of the sac of the pleura, through a fistulous opening into the lungs; or of an abscess in the liver, in this latter case deeply tinged with bile. The sputa have sometimes an extremely offensive odour. This may arise from the decomposition of the retained secretions of the air-passages, or it may indicate gangrenous destruction of the substance of the lung. Expectoration of *blood*, in larger or smaller quantity, is a common occurrence in disease of the heart and lungs.

901. *Hæmoptysis, Spitting of Blood.*—There are few cases of pulmonary consumption in which this symptom does not happen; and it must always furnish a strong presumption in favour of the existence of that disease. A scanty expectoration of blood may, however, occur in pneumonia, in acute bronchitis, and in the fit of asthma; and a copious and rapid discharge of blood by coughing in the rare disease known as bronchial polypus, and in aneurismal tumours communicating with the air-passages, as well as in confirmed pulmonary consumption. The colour of the blood, the matters with which, if not pure, it is mixed, and the mode of its discharge, should always be carefully inquired into, as it may be of great importance to distinguish the copious hæmorrhage from the lungs, in hæmoptysis, from the equally copious discharges of blood in hæmatemesis.

902. The sputa are sometimes submitted to *microscopical examination*. When they are of such consistence as to allow of it, it is advisable to wash them lightly in water, as extraneous matters from the mouth are apt to cling to them. Small portions of the mass may then be covered by thin glass and examined. In this way we may recognise the fibres of the elastic tissue of the air-cells, indicating a destruction of the substance of the lung, as in phthisis and gangrene of the lung (Fig. 44); casts of the minute air-tubes, as in pneumonia and bronchial polypus; and the small granular matter of tubercle in phthisis. The sputa in this disease are frequently found to be made up of semi-transparent round, oval, or triangular spots, consisting of small granular cells (*tubercle corpuscles*), mixed with free granules and oil-globules. Sometimes, also, the sputa in phthisis contain fragments of mixed phosphate and carbonate of lime, which effervesce on the addition of an acid.

Fig. 44.



903. (4.) THE URINARY AND GENITAL ORGANS.—The urine itself has been minutely examined in a previous section of this chapter. The indications afforded by the mode of passing the urine remain to be considered. It may be voided with difficulty (dysuria), or with an extreme of difficulty, attended by acute suffering at the neck of the bladder (strangury). The slighter degrees of dysuria are sometimes caused by pressure, or by irritation, propagated from a neighbouring organ. An accumulation of fæces in the rectum, or the irritation of worms, constitute causes of dysuria readily removed by a brisk aperient. Enlargement of the womb, as in advanced pregnancy, or irritation of the vagina, as in acute gonorrhœa, will produce the same symptoms in the female. Inflammatory affections of the rectum, such as dysentery, will also occasion it; and the irritant poisons cause it, partly by the inflammation set up in the rectum, partly by the irritating quality imparted to the urine. Two poisons especially, cantharides and turpentine, possess the property of inflaming the whole urinary system, and exciting strangury, with painful erections of the penis in the male, and excitement of the genital organs in the female. Frequent and painful micturition may also be occasioned by a highly acid state of the urine, by gravel, and by the poison of scarlatina in the course of its elimination by the kidneys. Affections of the bladder itself, such as inflammation (the offspring sometimes of catarrh, sometimes of gonorrhœa extending from the urethra), ulceration, spasm, and fungous growths, may give rise to the same symptom; or the cause of it may be traced to similar affections of the urethra, to stricture, to enlargement of the prostate, or to the passage of calculi.

904. *Retention of urine*, from an obstacle to the discharge of the urine actually secreted, must be distinguished from *suppression of urine* (ischuria), the effect of disease of the kidney, putting a stop to the secretion altogether. Retention of urine is sometimes the consequence of continued over-distension of the bladder, exhausting the power of the muscular coat; sometimes of disease of the spinal cord, causing paralysis of the coat; sometimes, probably, to a loss of sensibility of the part through disease of the brain, or extreme functional disorder of the nervous centres, as in continued fever and in typhous states of the system. Spasm of the neck of the bladder is another cause of retention of urine. It bears its part in the retention caused by want of opportunity to void the urine; and it sometimes occurs in hysterical females. In many cases the cause of retention is mechanical. The seat of the obstruction may be either in the ureter (as in the passage of a calculus from the kidney), or in the canal of the urethra from the same cause, or from enlargement of the middle lobe of the prostate, or from the pressure of a tumour external to the canal.

905. *Suppression of urine* (Ischuria renalis) means a cessation of the secretion of the kidneys. This may occur in consequence of idiopathic inflammation of the kidney, or of inflammation produced by poisons belonging to the class of irritants, especially cantharides and corrosive sublimate. It may also occur after scarlet fever; and it is a symptom

of Asiatic cholera. Congestion of the kidney, without inflammation, may also occasion it. The effect of prolonged suppression is great drowsiness, passing gradually into coma.

906. The *sexual organs of the male* occasionally furnish useful indications. A troublesome irritation of the glans penis and prepuce, with frequent erections (priapism), characterises stone in the bladder. Erections, without the irritation of the extremity of the organ, may also occur from congestion of the kidney, from irritation at the neck of the bladder, or from inflammation of the canal of the urethra. Painful erections, with curvature of the organ, constitute the most troublesome symptom of gonorrhœa. Priapism is also one of the marked symptoms of poisoning by cantharides; and it may attend poisoning by other active poisons of the irritant class. Erection of the penis, with a discharge of the prostatic fluid, and an expulsion of fæces, may also be mentioned as a not uncommon occurrence in death by hanging and decapitation; in poisoning by prussic acid; in the epileptic fit; and in other forms of sudden and violent death.

907. The *sexual organs of the female* are subject to a variety of diseases, some of which are deserving of notice as symptoms or concomitants of other diseases or disorders of the system. Anæmia, for instance, is often accompanied by amenorrhœa, as is the opposite state of plethora, though less frequently. Certain mental disorders, again, especially some forms of instinctive mania, and some varieties of monomania, are found associated with amenorrhœa, or with dysmenorrhœa, as also with the change of life. The importance attached to this function by patients, and the occasional association of disorders of menstruation with constitutional disturbance, and especially with hysteria, render it expedient for the medical man to inquire into the state of the uterine functions in all the cases that come under his care. The suppression of the menstrual discharge, the enlargement of the breasts, with the darkened and otherwise altered appearance of the areola, the change in the shape and size of the abdomen, and certain changes in the uterus itself, have great importance as signs of pregnancy.

908. (5.) THE NERVOUS SYSTEM.—The symptoms and signs of disease which have to be treated under this head consist of *a.* altered sensation, *b.* altered muscular action, or *c.* altered mental phenomena.

909. (*a*) *Altered Sensation*.—All the organs of sense may suffer in three ways: the sensation of which they are the seat may be blunted or lost, heightened or perverted. The muscles also, and those viscera of the body which are not organs of sense, and which, in health, perform their functions with an entire absence of sensation, may become, through disease, highly sensitive, and be the seat of acute pain. Again, all parts of the body, whether endowed with sensibility or not, may manifest pain on the application of pressure, or on being stretched much beyond their usual state of tension. On account of the universal importance of pain as a symptom of disease, it must take precedence of all other affections of the organs of sense.

910. *Pain*.—In estimating the value of pain as a symptom of disease, we have to consider its degree, its character, its seat, its extent, its duration, its persistence or otherwise, and its concomitants. In estimating the *degree* of pain, it is necessary to bear in mind the difference of expression used by different patients in describing pain, according as they have more or less general sensibility, more or less fortitude, and more or less honesty of purpose. The lesser degrees of pain are usually expressed by such words as slight, moderate, bearable; the greater degrees are spoken of as acute, intense, severe, violent, excruciating, agonising, distracting, intolerable. The only general principle of practical importance which can be laid down in respect of degrees of pain is, that the most acute pain is often occasioned by causes that entail the least danger to life; while, on the contrary, the lesser degrees of pain are often present in diseases of a far more formidable character. It ought also to be borne in mind that there are states of system which exaggerate pain, as there are states which tend to conceal it. Thus, in hysteric females, pain is often unduly acute; in typhous and lethargic states of system, the reverse.

911. The *character*, like the degree, of pain is subject to considerable variety, and gives some assistance in tracing it to its source and assigning its true cause. A *dull, obtuse, aching* pain is a common feature in congestions and sub-acute inflammations, and even in acute inflammations of soft and yielding parts and organs of the body. There is a dull, aching pain in the right side in congestion of the liver, in the loins in congestion of the kidney, and in the head, back, and limbs, at the onset of severe febrile attacks. A higher degree of the dull, aching pain is present in periostitis, in rheumatism, in gout, and in the milder forms of neuralgia, when it is distinguished as a *gnawing* pain. A *burning* pain is often present in severe inflammations, as a combined result of heat and tension. A *throbbing* pain is present in inflamed parts subject to pressure, as in the common whitlow, and also in all abscesses similarly circumstanced. Pain in parts of the intestinal canal is commonly described as *gripping* or *twisting*. In scirrhus tumours, and in neuralgia, the pain is designated as *shooting, cutting, darting, lancinating*.

912. The *seat* of pain sometimes affords useful indications by corresponding with the diseased part or organ which gives rise to it; and sometimes, also, by the part affected with pain being in connection with the immediate seat of the disease by the intervention of nerves more or less directly traceable from the one to the other. Thus, disease of the hip-joint occasions pain in the knee; stone in the bladder, pain in the glans penis (in the female, pain at the meatus urinarius); inflammation of the kidney, and calculus in the ureter, cause pain in the groin, thigh, and testicle; disease of the womb, pain in the loins; constipation, pain down the back of the thigh; inflammation of the liver, pain in the right shoulder; and disease of the heart, pain in the left arm, or down to the bend of both arms. Leucorrhœal discharges, and all causes which weaken the nervous and irritable female, give rise to pain in the left side; a tender state of the spinal cord, to superficial thoracic and

abdominal pains; and irritation at the root of a sensitive nerve to pain all the parts to which its branches are distributed. Some of these pains are called *sympathetic*.

913. Of the *extent* of pain it may be said (as a general rule subject to many obvious exceptions) that pain limited to one spot is more likely to indicate severe disease than pain of greater extent. The pains of muscular rheumatism are generally extensive, as are those which attack hysteric females. But, on the other hand, neuralgic pains are often limited to small spots, as the brow, or to single organs, as the testicle or mamma.

914. The *duration* of pain is a point of considerable importance, especially when taken in connection with the health of the patient. A pain of long continuance, not materially affecting the health, would probably be neuralgic; and in the female would be likely to be found in connection with other symptoms of hysteria. The *persistence*, or otherwise, of pain is also well worth attention. As a general rule, the pain in important local diseases is *continuous*, though liable to exacerbations, or, under the use of medicines, to abatement. In less important cases pains are *fugitive, wandering, shifting*. In one disease—brow-ague—the pain is *intermittent, or remittent*.

915. The *concomitants* of pain are also highly important. As a general rule, the pain of inflammation is increased by pressure, and the pain which has its seat in the muscles by motion of the part, or by brisk percussion with the points of the fingers; while neuralgic pains are independent of these causes, and the pains of colic are relieved by pressure. As a general rule, neuralgic, rheumatic, and gouty pains are compatible with health, or with only slight departures from it, while most other pains are associated with marked deviations from it.

916. *Diminished sensation*.—All the organs of sense may be the seat of sensibility blunted or lost; and as this impairment of sensation or total loss of it sometimes furnishes important indications, it will have to be considered as it affects the sense of touch, sight, hearing, smell, and taste.

917. The *sense of touch* may be so impaired as to give rise to the sensation of numbness, which may be brought about by cold, by pressure on the trunks of the nerves, or by the local action of narcotic poisons. In the absence of cold and narcotics, continued numbness would suggest the existence of pressure on the trunk of a nerve, or of some disease of the nerve itself, impairing but not destroying its function. Total loss of sensation in any portion of the body would be accounted for by stronger pressure or more severe disease of the nerve, or nervous centres. Loss of sensation in the upper or lower extremities, or in the whole body, is an occasional accompaniment of muscular paralysis of the same parts. A loss of sensibility is occasionally present in hysteric females, and may be brought about by narcotics and by mesmeric manipulations. In examining patients with a view to determine the presence or absence of sensibility, it ought to be borne

in mind that strong contractions of the muscles may follow the irritation of the skin from reflex action, in the absence of sensation.

918. The *sense of sight* is very variously affected, not merely from local causes attacking the organ itself, but also in consequence of disordered or diseased conditions of the brain. Slight and transient affections of the sight are common in dyspepsia, and in slight febrile and other disturbances of the circulation. These slight and transient affections consist in dark spots (*muscæ volitantes*), or bright spots, or sparks, or brilliant colours (as seen by drowning or hanging persons), or in simple indistinctness of vision, or in a flickering motion, or in a double vision, as in the drunkard, or in a half vision of objects. Spectral illusions have already been considered at p. 121. A heightened sensibility of the retina, accompanied by a dread of light (*photophobia*), is a common symptom of many acute inflammations of the eye itself, and of inflammatory affections of the brain. It may be also present in cases of acute anæmia from loss of blood, and in hysteria occurring in weak and delicate females. The opposite state of permanently diminished sensibility of the retina is usually connected with disease of the optic nerve, or of that part of the base of the brain from which the nerve arises. Transient dimness of vision, or actual blindness, sometimes occurs from loss of blood, from excessive lactation, or from other exhausting discharges, and it commonly precedes the state of syncope.

919. *Squinting*, when not a permanent state, is often due to affections of the brain, and is to be regarded as an unfavourable symptom. It is common in children as a consequence of disease of the brain attended by convulsions; and the permanent squint of the adult is often the result of an affection of the brain in infancy or childhood.

920. The state of the *pupil* is a symptom of importance. As a general rule it is contracted in irritation of the brain, whether that irritation be due to inflammation of the organ or to other causes, and it is also subject to extreme contraction in poisoning by opium and tobacco. On the other hand, the pupil is apt to be dilated in congestion of the brain, without irritation, in hydrocephalus, in epilepsy, in some cases and stages of apoplexy, and in functional disorders due to remote causes, such as constipation and intestinal worms. It is also dilated in poisoning by belladonna, and by substances belonging to the class of narcotico-acrids, as well as by the local application of the more active members of this class. The condition of the pupil is also an indication of the state of the retina. If it contracts freely on the admission of light, the retina has not lost its sensibility. Its non-contraction under the stimulus of light indicates a loss of sensibility in the nerve, and, in certain cases, of the entire nervous system. When, in the absence of disease of the eye itself, the pupil of one eye is dilated while that of the other is contracted, cerebral disease may be presumed to be present. The state of the surface of the eye is used as a test of the state of the nervous system. If insensible to the touch, the nervous system generally may be assumed to be in the same state. Thus it is insensible in

true epilepsy, and under the full influence of chloroform; but in the feigned disease responds to the touch.

921. *The sense of hearing*.—This sense is subject to analogous affections with the sense of sight—to ringing sounds (*tinnitus aurium*), to distinct musical notes, and to puffing sounds like the noise of a locomotive. All of these may occur from slight and transient causes, and need not excite apprehension. But they may also usher in chronic or acute diseases of the brain. Of more marked illusions of the sense of hearing, something has been said at p. 121. The sense of hearing is generally acutely painful in inflammatory affections of the brain; and, in common with the sight, in the opposite state of the cerebral circulation; also in some cases of hysteria. *Deafness* is a common occurrence, and often a favourable sign, in febrile diseases, and in the febrile exanthemata. In some instances it is associated with cerebral disease and forms one of the group of symptoms by which its presence may be recognised.

922. *The sense of smell*.—This sense is subject to illusions similar to those which affect the eye and ear; but the disorders of this sense have little significance as signs of disease.

The sense of taste has been already considered in § 882.

923. (b) *Altered muscular action*.—The muscles are subject to paralysis, to convulsion, and to spasm. *Paralysis* may be local or general, or of greater or less extent. It may affect the muscles of the tongue, or the muscles of the upper eyelid (causing ptosis), or several of the muscles of the eyeball (causing strabismus), or the muscles supplied by the facial nerve (causing palsy of one side of the face), or the muscles of one arm or one leg, or the muscles of one side of the body (hemiplegia), or the muscles of the lower half of the body (paraplegia). The loss of power may also vary in degree, being complete or incomplete. The cause of local paralysis may be either pressure in the course of the nerve supplying the palsied part, or disease at the origin of the nerve in the brain or spinal cord. As a general rule, paraplegia may be traced to injury or disease of the spinal cord, and hemiplegia to disease of one hemisphere of the brain. A local and limited palsy, traced to a nerve issuing from the base of the skull, becomes an important indication of cerebral disease, if accompanied by palsy of some part supplied by a nerve issuing from another foramen.

924. *Convulsive muscular actions* often afford important indications. Some distinctions worth bearing in mind are referred to at § 486. The convulsive actions most important to observe at the bedside are the twitchings of the muscles in low febrile attacks, known as *subsultus tendinum*, that picking at the bedclothes known as *hoccitatio*, and the tremulous protrusion of the tongue. These symptoms only occur in cases which combine great weakness with much excitement of the nervous system; and they may be looked upon as highly unfavourable, though not as fatal, symptoms. Convulsions are also of common

occurrence in infancy and childhood, and may be brought on by the irritation of teething, constipation, or worms. They are also present, sometimes as an early symptom, in hydrocephalus. In young persons they show themselves in the form of chorea or epilepsy; in adults in epileptic and hysteric seizures, in delirium tremens, in uræmia, and in many kinds of poisoning. They may also occur on one side of the body, while the other is the seat of paralysis. In sudden death from great violence, or from large doses of active poisons, such as prussic acid, general convulsions, attended, as in epileptic fits, by expulsion of urine and fæces, precede death.

925. *Spasmodic actions of the muscles*, or prolonged and rigid contraction, occur in tetanus and in hydrophobia; also in some forms of hysteria. Similar rigid contractions of single muscles, or of groups of muscles, of long continuance, attend organic disease of the brain, and constitute very formidable symptoms. Strabismus is one consequence of rigid contraction of a single muscle.

926. (c) *Altered Mental Phenomena*.—These have been already treated of in a former chapter, p. 120; it only remains in this place to speak of that condition known as coma. Coma is a state of complete insensibility and loss of motive power. It may arise from several causes: from apoplexy; from poisoning by opium, carbonic acid gas, or other substances belonging to the class of narcotics and narcotico-acids; from drunkenness; from the operation of intense cold; from poisoning of the blood in some disorders of the urinary organs (uræmia); and from accumulation of serum in or on the brain. It is often important to distinguish the coma of drunkenness from that of apoplexy: in doing so we are assisted by the odour of the breath.

927. (6.) THE EXPRESSION OF THE COUNTENANCE, AND THE CONDITION AND ATTITUDE OF THE BODY.—*The expression and aspect of the countenance* often afford great assistance in the diagnosis of disease; but it is not easy to convey a just idea of the physiognomy of disease by verbal description. The different forms of mental disease are strongly marked on the countenance of the sufferers. The wild excitement of mania, the deep despondency of melancholia, the vacant look of the idiot and imbecile, are familiar to all observers. Patients suffering from delirium tremens have often an air of extreme suspicion, and the habitual epileptic comes to wear an expression peculiar to himself. Again, phthisis, emphysema, organic disease of the heart, diabetes, and Bright's disease, betray themselves to the experienced physician by the expression of the patient's countenance; and hysteria is often detected by rapid transitions from tears to smiles, and by an appearance of health in bad keeping with the complaints of the patient.

928. *The condition of the body* in respect of nutrition, colour, and temperature of surface, and dryness or moistness of skin, ought always to engage the attention of the practical physician. Rapid loss of flesh, or sudden corpulency, should equally excite attention. The one is common in such wasting maladies as pulmonary consumption, diabetes

mellitus, and organic disease of the stomach, as well as in diseases attended by profuse discharges; also in the decay of aged persons; the other is not uncommon after recovery from attacks of pulmonary consumption, and it sometimes precedes attacks of apoplexy. Corpulency may also result in healthy persons from the transition from active to indolent habits.

929. *The posture of the body* is often highly characteristic. It betrays loss of power in the paralytic, and weakness in the exhausted. The last stage of fever and of all exhausting maladies is marked by the helpless attitude on the back; and the assumption of a position on the side, such as is common in sleep, often affords one of the earliest and most welcome signs of commencing recovery from fever. The sitting or semi-recumbent posture, with the head raised by pillows, is highly characteristic of diseases directly or indirectly affecting the breathing. It is common in most severe diseases of the lungs, as well as in advanced diseases of the heart. The recumbent posture, with the legs drawn up, is equally characteristic of painful disease of the abdominal viscera. In diseases of the chest it is important to note on which side the patient lies with most ease and comfort. As a general rule the patient lies on the diseased side of the chest; but the choice of position being determined in one case by a sense of pressure, in another by a sense of dragging, in a third by the facility with which the fluids of the lung gravitate to the air-tubes, and in many cases by several conditions combined, the inferences to be drawn from posture are less satisfactory than could be wished. In painful diseases of the abdominal viscera, the patient, as a general rule, lies easiest on the side of the disease.

CHAPTER V.

HYGIÈNE.

930. In a large proportion of the cases that come under the care of the physician, both in private practice and among the poor, it is necessary to pay some attention to those circumstances which affect the general health of the patient, and to lay down rules for his guidance in matters that belong rather to the province of Hygiène than to the Practice of Physic. Indeed it often happens that the only remedial measures which the physician feels called upon to prescribe consist of a change from bad to good habits of life, from an unhealthy residence or locality to a healthy one, from intense application to study or business to repose of mind and complete change of scene and occupation. In a very numerous class of cases, again, change of climate is the appropriate remedy, and the physician is required to make choice of a locality suited to the disease or state of health of the patient. The subject of *climate*, therefore, falls to be considered in this place.

With this regulation of the habits, and residence of their patients, the hygienic duties of the greater number of medical men terminate; but

there are duties of a larger and more comprehensive character in the right performance of which many medical men are directly interested—some as officers to public institutions, such as workhouses, prisons, schools, hospitals, and lunatic asylums; some as officers in the army and navy, in charge of camps, barracks, ships of war, and merchant and emigrant vessels; others, again, as district officers of health.

The subject of this chapter may, therefore, be properly treated under the two distinct heads of *private* and *public* hygiene.

1. PRIVATE HYGIÈNE.

931. The principal matters which require to be regulated with a view either to the preservation of health in the strong, or its restoration in the invalid, are diet, exercise, clothing, condition of dwelling, place of residence, and habits of life.

932. The subject of *diet*, as appropriate to persons of different ages, and as applicable to particular maladies and states of system, will be treated in the next chapter.

933. *Exercise*, regulated according to the condition of the patient, is one of the most important of our therapeutic agents. It may be of two kinds—*active* or *passive*: in the one case the patient moves about by the exertion of his own muscles, in the other he is borne from place to place. Walking, running, dancing, rowing, fencing, boxing, wrestling, drilling, and all gymnastic exercises and active games, belong to the first class; carriage exercise, sailing, rocking, and swinging, to the second. Riding at a foot-pace belongs also to the class of passive exercises; while the paces which require more exertion combine the advantages of the two classes.

934. Both kinds of exercise call the muscles into play, at the same time that they promote the circulation of the blood. In passive exercises the muscles are employed in maintaining the posture of the body, and the circulation is quickened by the displacement of the blood which accompanies each sudden change in the level of the body.

935. In addition to the advantage derived from the promotion of the circulation of the blood, active exercises, by calling the abdominal muscles into play, promote the natural action of the bowels. Those exercises, too, whether active or passive, which are carried on in the open air, have the incidental advantage of supplying a purer air for the purpose of respiration. They also imply a change of scene and occupation, which reacts favourably on the mind of the invalid.

936. In selecting the kind and amount of exercise to be prescribed, the physician must be guided by the circumstances of each particular case. In the absence of organic disease, and where the patient suffers merely from general debility, brought on by overwork, intense study, or too close an attention to business, the choice of an appropriate exercise must be mainly determined by the circumstances and tastes of the patient himself. If practicable, change of air and scene, with the ex-

ercise which travelling implies, should be insisted on ; and, where the strength allows of it, pedestrian exercise. A sea voyage is in these cases to be preferred to carriage exercise. When the patient is unable to quit the scene of his studies or business, horse exercise in the morning or evening of the day will be found the most suitable ; and this is especially the case with the inhabitants of large cities who cannot readily reach the country on foot. Fencing, rowing, quoit-playing, archery, and cricket, have the double advantage of bringing all the muscles of the body into play, and of compressing a great amount of exercise into a small compass of time. Archery deserves encouragement as an exercise suited to persons of either sex.

937. In the case of growing children of delicate health, exercise is of the greatest importance, and the active games of childhood, or equestrian exercise, may be combined with instruction in the graceful accomplishments of dancing and fencing. It often happens in these cases that much anxiety is felt respecting the healthy development of the chest, especially where a tendency to consumption is supposed to exist. With a view to promote this important object the manly exercise of fencing may be strongly recommended for young men, and the nearest convenient approach to it for young females. It is greatly to be preferred to dumb-bells, to the clubs, or to other analogous exercises which consist of tedious repetitions of the same movements. Reading aloud, so strongly recommended by ancient medical authorities, might be revived with great advantage ; but in order to guard against the formation of habits of reading injurious to the free play of the lungs, a judicious teacher should be engaged. Singing, properly taught, has the same recommendation.

938. In patients labouring under organic disease of the lungs or heart, all the stronger exercises, whether active or passive, are inadmissible. Walking on level ground is, in such cases, the strongest exercise which can be safely prescribed, and is greatly to be preferred to almost any form of passive exercise except that of the carriage or garden chair. Running, or even walking at a brisk pace, and all athletic sports are inadmissible. The more violent exercises, especially rowing in races, have often given rise to these diseases in persons having every appearance of strength and vigour. Gymnastic exercises, requiring a prolonged and violent action of the same muscles, are also open to the same objection.

939. On the subject of *clothing* much misapprehension exists. There is a strong tendency towards over-clothing of the body, and especially of the chest, with a view of guarding against pulmonary disorders ; and in order to avoid the danger of catching cold, a delicate patient is often made to wear, in the very height of summer, as many flannels and skins as would guarantee the temperature of the body in a polar winter, and in this way the very risk is incurred which it is deemed so important to avoid. The same error is committed by heaping on the patient a load of bed-clothes, much exceeding what

is required to preserve the proper temperature of the body; and by causing him to wear flannel next the skin at night.

940. An opposite error is sometimes committed in very young children, under the erroneous notion of hardening them, but in forgetfulness of the comparative difficulty with which young persons maintain their proper temperature. At the other extreme of life, also, warm clothing is highly necessary, and especially in patients suffering from pulmonary affections. In these cases it is also highly necessary in severe weather to keep up the temperature of the sleeping apartment throughout the night.

941. A similar error is committed by young men, when they persist in wearing no other covering to the chest throughout the year but the linen shirt, and refuse to wear cotton or flannel next the skin in winter. In persons subject to perspire freely, a thin cotton vest next the skin should be worn even in summer. In hot climates cotton, and in cold climates flannel, is the proper material for body-clothing.

942. The importance of an immediate change after exercise accompanied by profuse perspiration, or when the clothes are wet, need not be insisted on.

943. The *condition of his dwelling* is of great importance to the invalid. The points to be attended to in choosing a house, or in planning a residence, are chiefly the following:—

Site and soil.—Where there is a free choice, a gravelly or chalky soil and sloping ground are to be preferred to a clay soil and low level site. A tenacious clay soil, or a rich alluvium, or a dry surface soil with water at a short distance beneath, should be avoided, but especially the flat banks of rivers or streams, or the flat base of hills, as well as marshy spots, and the neighbourhood of stagnant water. The worst combination of site and soil is a flat rich alluvial deposit between a hill and a stream. Such spots are favourite haunts of continued fevers, as marshes are of agues. This combination exists in an extreme degree on the south bank of the Thames, to the great detriment of the health of the inhabitants, and the encouragement of epidemics.

Aspect.—In England, a south aspect is to be preferred to all others, as being free from the extremes of heat and cold; and it is admirably suited to the invalid. A north aspect lacks both light and warmth. An east aspect has the advantage of the light and warmth of the morning sun, but it is exposed to the cold drying winds of winter. A west aspect is open to the objection of being too hot in the after part of the day. In houses which can have only two opposite aspects, a south-east and a north-west aspect are to be preferred. When there is perfect freedom of choice, a morning room to the east, the principal sitting-room to the south, with bed-rooms to the south for invalids and aged persons, and to the east for young and healthy ones, is a desirable combination. Larders and store-rooms should be to the north.

Shelter.—Houses require shelter from the north and the east. When

such shelter is not afforded by nature, it may be obtained by plantations, which should in no case be so near the house as to obstruct the free movement of the air, or to endanger the foundation of the building by the growth of the roots. To the south and west the house should be open; but large trees at a moderate distance from the house, on the west side, afford a grateful shade from the heat in summer.

Water-supply.—A good supply of clear, colourless spring water, and a supply of rain-water amounting to at least ten gallons per head per diem for a month are great desiderata.

Drainage.—The soil on which the house stands should be thoroughly drained, and all offensive refuse promptly removed by impervious drains properly trapped. Water-closets should be so placed that the drains may not pass under the house. In erecting places of convenience out-of-doors, the spots chosen should not be too near the dwelling, and the barbarous custom of digging deep cesspools should be avoided. The proper construction is that generally adopted in many northern towns. A sloping piece of ground should be selected or made; on this slope the offensive matters and slops from the house should be received, and the dust with the ashes from the fires should be thrown upon them, through a hopper in the side of the building. At short intervals of a week, fortnight, or month, the accumulated matters should be removed and thrown upon a compost-heap. These simple arrangements have the advantage of being both wholesome and economical.

The preservation of our dwellings from dampness is of the very first importance. To accomplish this end, it is not sufficient to make the roof of the house proof against the weather, the basement also requires to be attended to. The floor or pavement should be raised on dwarf walls, supplied with air-bricks, and the house should be surrounded by an area or air-drain, so that the walls may be preserved from contact with the soil. These precautions are especially necessary in clay and rich alluvial soils.

Light and air.—The rooms should be lofty and spacious, furnished with open fire places, and windows opening above and below; and staircases should be well lighted and well aired by windows opening upon them. Staircases lighted by sky-lights, even when the lights admit of being open, are objectionable, unless they are very spacious. The purity of the air of the several apartments, and especially of the bedroom of the invalid, should be guaranteed by means of *ventilation*. To this end no inhabited room should be without an open fireplace, for the escape of impure air. When the rooms are spacious, no further provision for ventilation is required beyond the facility of opening doors and windows. But small apartments used as sleeping-rooms require a constant provision for the renewal of the air by means of ventilators constructed with a view to the prevention of drafts.

944. With a view to the preservation of the health of young and delicate children, it is essential to provide for the free ventilation of their sleeping apartments. Overcrowding and consequent impurity of the air in such apartments is a common cause of disease in the children

even of affluent persons, and the principal source of the high mortality of the children of the poor. In addition to the precautions for insuring thorough ventilation of sleeping apartments, a certain amount of space, not falling short of the thousand cubic feet insisted on in § 244, should be allotted to each child.

945. In cities, and even in rural districts, the external air admitted into the houses both of rich and poor is often very far from being sweet or pure. In the country the causes of impurity are few in number, being chiefly the gases from stagnant pools, ponds, or marshes, or the effluvia from cesspools, farm-yards, stables, pig-sties, or heaps of manure. These sources of impurity should always be placed at some little distance from dwelling-houses; at any rate, they should not be suffered to remain in contact with them.

946. In large cities the sources of aerial impurity are much more numerous. In addition to those which exist also in rural districts, but become doubly objectionable from narrow space and imperfect movement of the air, there are others which arise from processes of manufacture peculiar to towns, from the necessity of heaping up, at least for a short time, the dust and ashes removed from our houses, from the difficulty of consuming the smoke issuing from our chimneys, and from the defects almost necessarily arising in a large and complicated system of sewerage.

947. *Warming.*—The warming of our apartments should be so effected as not to interfere with ventilation. Close stoves should, therefore, on no account be employed in occupied apartments. Their use should be restricted to entrance halls, staircases, and large rooms occupied only occasionally. For occupied rooms the best combination is that of an open fireplace of sufficient size and good radiating surface, with double windows, double panes of glass, or thick plate glass. In this way (especially when the walls of the house are thick, or double) any temperature that may be desired can be combined with the advantage of complete ventilation. This mode of insuring a warm pure air is of great importance in pulmonary diseases, especially in the bronchitis of aged persons.

948. Among the *habits of life* which most militate against health, and which, so long as they remain unchanged, tend to counteract the effects of the best medical treatment, the most important are sloth, luxury, dissipation, indulgence in the pleasures of the table, the abuse of spirituous liquors, opium, and tobacco, irregularity in the time of taking meals and rest, and want of personal cleanliness.

949. For those persons whose constitutions have been undermined by sloth, luxury, and dissipation (chap. I., § 86), travelling and the wholesome observances of fashionable watering-places, such as early rising, regular hours for meals and exercise, the frequent use of baths, and cheerful and congenial society, are the only remedies of any value which the physician has it in his power to prescribe. As intemperance and indulgence in the pleasures of the table are the besetting temptations

of the same persons, there is perhaps no better way of guarding against them than by prescribing foreign travel, or a residence at fashionable watering-places.

950. When the abuse of spirituous liquors, opium, or tobacco is brought under the notice of the physician as a cause of disease, steps should be taken to abolish these bad practices slowly and gradually, not merely on account of the greater safety of this procedure, but also because of the greater ease with which the patient may thus be made to lay his habits aside.

951. Irregularity in the time of taking meals and rest is an evil incident to the active and busy life of large cities, and one which the physician is often called upon to remedy by prescribing such improved habits of life as are compatible with the exigencies of the patient's business.

952. A want of personal cleanliness is more frequently chargeable against persons of education than might at first sight be expected. The practice of daily ablution of the whole body is observed by a comparatively small number of persons; but it is one which ought to be insisted upon as an excellent tonic, as tending to guard the body against catching cold, and as keeping the skin in a proper state for the performance of its functions. The occasional use of the warm bath, to insure a more perfect cleansing of the skin, is also to be recommended. The practice of daily ablution with cold water, followed by friction with a rough towel, or hair gloves, or the flesh-brush, is often of the greatest benefit to those who have an hereditary predisposition to consumption, or who have already manifested a tendency to that disease.

953. *Change of air or climate* is generally esteemed one of the most important means of preserving, improving, and restoring health. There are two classes of persons to whom it is usual to recommend a change of climate. The one class consists of invalids who suffer from no defined disease, but whose general health has been impaired by exposure to one or other of the many unwholesome influences which attend a residence in large towns (see § 71 and seq.); the other class consists of persons suffering from some well-defined malady, such as chronic dyspepsia, chronic rheumatism, scrofula, pulmonary consumption, chronic bronchitis, and asthma.

954. To the mere invalid, whose constitution has suffered by the cares and anxieties of business, the dissipation of a town life, or the *ennui* of an idle and useless existence, change of climate is chiefly valuable as affording facilities for change of habits, change of scene, and change of occupation. In advising persons so circumstanced, little more is required than to avoid climates positively unhealthy. With this exception, the countries or places which offer the greatest facilities for change of habits and occupation; and in the case of the victim of *ennui*, the greatest facilities for exertion of mind and body, are to be preferred.

955. In advising patients suffering from any of the diseases just specified, a more exact knowledge of climate is required, at the same time that many considerations of personal convenience will have to be carefully weighed. Assuming that there are no circumstances peculiar to the patient which render a change of residence inexpedient, the medical man will have first to consider the kind of climate best adapted to the disease under which the patient suffers, and then to select from a number of places possessing the required climate the particular one which is, on the whole, to be preferred.

956. In making choice of a climate, we may either consider the state of the patient's system, without reference to the disease under which he labours, or we may be guided solely by the nature of his malady. The state of the system may be either one of relaxation, characterised, if the disease affect any of the mucous membranes, by excessive secretion; if the glandular system, by indolent swellings or ulcers; if the skin, by chronic cutaneous affections; if the locomotive system, by chronic rheumatism and atonic gout. A cold skin, and a weak pulse often below the natural standard of frequency, with general languor of all the functions of the body, characterise this state. On the other hand, the state of the system may be one of irritation, with a dry state of the mucous membranes, a harsh dry skin, and a frequent quick pulse, with a tendency to more acute forms of inflammation. In the state of relaxation, a dry bracing climate is indicated; in the state of irritation, a mild moist climate. In both states of system, it is important to avoid a great increase of temperature as tending to exhaustion, sudden changes of temperature as giving rise to colds and slight febrile attacks, and the east and north-east winds, as shown by experience to be peculiarly trying to the invalid.

957. These observations will apply to all the diseases in which change of climate is commonly recommended, with the exception of chronic rheumatism, gout, and calculous disorders, in which a higher temperature appears to be advantageous. The climate of the East and West Indies, and of the Cape of Good Hope, is deemed suitable to this class of invalids.

958. As a general rule, the bracing spots adapted to a state of relaxation of the system are those which are elevated, scantily wooded, exposed to the prevailing winds, and consisting of a gravelly or chalky soil; on the other hand, the mild moist climates are to be found in low situations, on clay soils, wooded, and partially or wholly uncultivated, and sheltered from the prevailing winds. As a general rule, too, the climate of the sea-shore is milder and more uniform than that of the interior, being warmer in winter and cooler in summer. Watering-places have also the twofold advantages of pure sea-breezes and of sea-bathing.

959. Bearing these considerations in mind, it will be easy to point out, among the more common resorts of the invalid, the places in Eng-

land and abroad which are best adapted to the two opposite states of relaxation and irritation.

960. The mild sheltered places chiefly resorted to on the coasts of England are Undercliff in the Isle of Wight; Hastings on the south coast; Dawlish, Sidmouth, Exmouth, and Salcombe, on the coast of Devonshire. The sheltered spots in the islands of Guernsey and Jersey offer the same advantages. Among foreign watering-places, Pau in the south-west, and Hyères and Nice in the south-east of France; Rome and Pisa in Italy; Malaga in the south of Spain; and the islands of the Northern Atlantic, namely, Madeira, the Canary Islands, and the Azores; and those of the Western Atlantic, namely, the Bermudas and the Bahamas, have the same mild relaxing climate.

961. On the other hand, the mild bracing spots adapted to invalids suffering from a state of debility and relaxation without irritation, are, in England, Brighton, on the south coast; Torquay, on the coast of Devonshire; Clifton, on the western coast; in France, Montpellier; and in Italy, Naples.

962. The places named in the two preceding sections must be understood to be intended chiefly for winter residence, the summer being spent in suitable inland watering-places, such as Malvern, Cheltenham, Leamington, Tunbridge Wells, Matlock, and Buxton, in England; or in any of the several watering-places among the higher Pyrenees in France, or the better-situated spas of Germany.

963. The climate best adapted for a residence continued during the entire year is perhaps that of Madeira, which to moderate fluctuations of a temperature little exceeding that of the milder parts of England, adds the advantage of a drier atmosphere, except during the prevalence of the autumnal rains.

964. The diseases in which change of climate may be expected to be most beneficial are emphysema, chronic bronchitis, asthma, and all those affections of the air-passages and lungs in which previous experience has shown that the patient suffers severely in winter and is comparatively well during the summer. The efficacy of change of climate in all stages of pulmonary consumption, from the incipient to the most advanced stages, is a subject of great difficulty: but there is no doubt that in that condition of health known as tubercular cachexia (the presumed forerunner of tubercular deposit) as in other forms of cachexia, change of climate is advantageous. Whether a mild bracing or a mild relaxing climate is to be chosen will greatly depend upon the state of the system, whether it be one of languor and torpid action, or one of feverish excitement.*

965. There are certain conditions of system in which it is expedient to combine with change of climate the alterative effects of minute doses

* Consult, on the subject of Climate, Sir James Clark's able treatise.

of saline or other substances in a state of solution ; in other words, to select as the scene of the required change of climate, regimen, and occupation, some spot where access can be had to mineral waters. Such places abound both in England and on the Continent.

966. The *mineral waters* most in repute may be divided into four classes—the *saline*, the *chalybeate*, the *sulphureous*, and the *acidulous*, to which may be added the *hot springs*. A short description of each of these classes, with the principal watering-places where they are found, will assist the physician in his choice.

(1.) *Saline Mineral Waters*. These consist of variable quantities of the chlorides, sulphates, carbonates, and nitrates of potash, soda, lime, magnesia, and alumina, to which may be added, as of rare occurrence, free carbonic or sulphuretted hydrogen gas, the salts of iron, in small quantity, with traces of phosphoric acid, iodine, and bromine. Sea-water is a concentrated form of this class of mineral waters. These mineral waters act as gentle aperients, and are adapted to the case of patients suffering from dyspepsia, from habitual constipation, and from functional derangement of the liver. The waters of Cheltenham, Leamington, and Scarborough, in England ; of Spital-on-Tweed, Pitkathley, Airthrey, Dunblane, and Innerleithen, in Scotland ; and of Ems, Carlsbad, Homburg, Seidschutz, Kreuznach, and Pülna, in Germany, belong to this class. Some of these mineral waters contain minute quantities of iodine and bromine, and, for that reason, commend themselves in scrofulous disorders, accompanied by glandular enlargements. The waters of Kissingen and Kreuznach contain the bromide of sodium in sufficient quantity (a third and a fourth of a grain in a pound of water) to have some effect if taken freely and for a continuance. The strongest waters belonging to this class are, in England, those of Cheltenham and Leamington ; in Scotland, those of Airthrey ; in Germany, those of Pülna, Seidschutz, Homburg, Kreuznach, Kissingen, and Marienbad.

(2.) *Chalybeate Waters*. These waters contain variable quantities of the sulphate and carbonate of iron, and are, therefore, possessed of tonic properties, and are especially adapted to the treatment of anæmia, and of functional disorders of the uterus. They are slightly stimulating, and require to be combined with aperient medicines. The waters of Tunbridge Wells and Harrogate in England, of Hartfell Spa and Vicar's Brig in Scotland, of Spa and Tongres in Belgium and the Low Countries, of Passy near Paris, and of Rennes in the south of France, belong to this class.

(3.) *Sulphureous Waters*. These waters abound in free sulphuretted hydrogen gas, and are prescribed in several forms of cutaneous disorder. The waters of Harrogate in England, of Moffatt, Strathpeffer, and Rothsay in Scotland, of Enghien near Paris, of Barèges in the higher Pyrenees, of Aix and Leuk in Switzerland, and of Aix la Chapelle in Prussia belong to this class.

(4.) *Acidulous Waters*. These waters are characterised by the quantity of free carbonic acid which they contain. They are also more or less rich in saline ingredients ; so that they might be placed with almost

equal propriety with those enumerated in Class 1. The excess of free carbonic acid constitutes their claim to a place by themselves. They are applicable in the same cases in which saline waters are found useful, but, being more stimulant, they are better adapted to cases characterised by great debility. The chief mineral waters belonging to this class are those of Ilkeston in Derbyshire, of Kissingen, Marienbad, Auschowitz, Eger, Pyrmont, Spa, Fachingen, Geilnau, Seltzer, and Homburg in Germany; of Pougues, Mont d'Or, and Vichy in France; and the Saratoga Congress Spring in America. The waters of Carlsbad and Ems contain comparatively small quantities of free carbonic acid. The chief acidulous waters of Germany, classed according to the quantity of carbonic acid which they contain, beginning with the richest, are—Geilnau, Pyrmont, Eger, Auschowitz, Spa, Fachingen, Homburg, and Seltzer. The waters of Homburg take the first place among the waters of Germany for combined richness in saline substances and free carbonic acid.

(5.) *Hot Springs.* These waters are useful both as baths and as internal remedies. As baths they have the advantage of containing, like sea-water, but in smaller quantity, certain saline ingredients, which act as general stimulants to the surface. Taken internally they possess, according to their strength, the properties of the class of saline waters. The principal waters belonging to this class are those of Matlock, Bristol, Buxton, and Bath in England; of Carlsbad, Ems, and Wiesbaden in Germany; of Baden in Switzerland; of Plombières and St. Nectaire in France. Some of these hot springs contain, in addition to saline substances, a certain quantity of free carbonic acid.

967. In some springs the constituents of the waters are such as to give them a place in more than one class, and to entitle them to compound appellations, such as *saline chalybeates*, named from their combining the constituents and properties of saline and chalybeate springs. At some of the favourite watering-places, both in England and on the Continent, springs belonging to the several classes of mineral waters are to be found. Both Cheltenham and Leamington, for instance, have saline, chalybeate, and sulphureous waters; and Harrogate, in addition to strong and mild sulphur-waters, has its pure and its saline chalybeates.

968. There is no way in which most of the bad habits already referred to (§ 949) can be more effectually broken through than by a residence at some of the least frequented of the continental watering-places. Those which are most frequented are often the worst adapted to this end, as they combine the luxuries and temptations of large towns with the absence of those natural beauties which offer so wholesome an inducement to pedestrian and other exercises.

2. PUBLIC HYGIÈNE.

969. The saddest pages in the history of all nations are those which treat of the wholesale sacrifice of human life through ignorance or

neglect of the simplest means of preserving health and averting disease. Such sacrifice of life has occurred in lying-in hospitals from mere insufficiency of space and neglect of ventilation; in foundling hospitals from the same causes, combined with absence of the mother's care and want of the infant's proper nourishment; in schools from want of space, neglect of cleanliness, and insufficient and improper food; in workhouses and prisons from the same causes, added to idleness, listlessness, and depression; in civil hospitals chiefly through want of space; in military hospitals from the same cause, added to the want of proper medical attention and nursing, and sometimes of proper food and medicine; in emigrant and transport ships, and men-of-war, from narrow space, foul air, bad water, and bad food; in armies in the field from ill-chosen encampments, bad provisions, overcrowding, neglect of cleanliness, and intemperance. Convulsions, infantile tetanus, and gangrene of the mouth; marasms; puerperal fever; Asiatic cholera; jail fever; typhus, relapsing fever, 'parish infection,' and 'the sickness of the house;' scurvy; diarrhœa and dysentery; ophthalmia; malignant ulcer and hospital gangrene,—have all been traced to such causes: while all epidemic maladies, small-pox, plague, sweating sickness, black death, and cholera, have committed their worst ravages among men, women, and children crowded together, and wanting in one or more of the simple requisites of pure air, good water, cleanliness, due shelter, efficient drainage, appropriate clothing, and wholesome and suitable food.

970. It is no disparagement to the art of healing to say that more lives have been sacrificed to a neglect of the simplest means of preserving health than can have been saved by the most skilful medical and surgical treatment. It is of the first importance, therefore, that the physician should be prepared to understand and recommend with authority the measures to be adopted in order to preserve the health of men, women, and children when of necessity congregated in large numbers. The precautions to be adopted might, indeed, be inferred from what has already been said in this chapter on diet, exercise, clothing, condition of dwelling, place of residence, and habits of life, and, in the earlier chapters of this work, on the causes of disease; but the precepts thus laid down for individuals require to be somewhat modified to meet the cases of men, women, and children in the aggregate.

971. Of foundling hospitals, for the reception of very young infants, it is not necessary to say more than that they are as indefensible on physical as on moral grounds, and that it would be a waste of time to point out the means of reducing the mortality to which they must be subject. The same observation applies, though not with equal force, to lying-in hospitals. The danger of congregating large numbers of puerperal women within their walls is obvious, and can only be averted by a largeness of space and freedom of ventilation to which the expense must always be a serious obstacle.

972. In speaking of schools, it will be sufficient to remark that the number of contagious maladies to which children are subject

renders an observance of all the rules of health presently to be laid down for adults doubly necessary.

973. To prisons, in a sanitary point of view, attaches the necessary drawback of confinement at a time of life when the desire for active employment is at its height. The inmates of workhouses must share this evil with prisoners; and it cannot admit of doubt that when, to the evils of confinement in the case of the healthy, are added those of sick-wards with inadequate accommodation, limited space, and a scale of expense adapted, of necessity, rather to the means of the poorer rate-payers than to the strict necessities of the case, workhouses have always been, and must continue to be, highly destructive of human life. The means to be employed for securing the health of their inmates do not differ from those presently to be enumerated.

974. Sailors and persons on board ship, and soldiers on service, are exposed to special disadvantages; sailors to unusual narrowness of space, and to close confinement in rough weather, often combined with bad water, scanty and unwholesome food, and great exposure and fatigue; soldiers to the same evils in nearly the same degree, with the superadded disadvantage of equal exposure to the weather with less shelter, encampment on unhealthy spots, and prolonged occupation of badly-selected sites for barracks and hospitals.

975. In treating of the means of preserving health and preventing disease among bodies of men there will have to be considered: 1. The case of persons confined within such buildings as prisons, workhouses, and barracks. 2. The case of the sick in hospitals. 3. The special case of persons living for a time on board ship, as sailors and emigrants. 4. The case of sailors and of soldiers in actual warfare.

976. 1. The means of preserving the health of persons confined within such buildings as prisons and workhouses are those already described in the beginning of this chapter as applicable to individuals and families, with a few obvious modifications. The buildings themselves should be so constructed as to combine a healthy site and suitable aspect with good water supply, thorough drainage, spacious living and sleeping rooms, facilities for oversight and inspection, and ground for exercise and wholesome labour. The portions of the structure requiring drainage should be placed on the skirts of the building in such a manner as to obviate the necessity of carrying the drains under the building itself; the walls should be surrounded by air-drains; the lower storey of the building should be so constructed that the floor shall not be in contact with the soil; the purity of the air should be provided for by a space in living and sleeping rooms not falling short of 1,000 cubic feet, and warmth and ventilation conjointly by open fire-places, and windows, glazed with thick glass, or with double panes of common glass, and opening above and below. In prisons, warming by hot air, hot water, or steam, and ventilation by mechanical aids are perhaps necessary. In all other buildings these modes of warming and ventilating are highly objectionable, except for passages and halls, and for rooms occupied only occasionally, and for short periods of time.

In this class of buildings scrupulous cleanliness is to be insisted on, not merely for its own sake, but for the occupation it gives; facilities for exercise have not merely to be afforded, but exercise itself to be organized and superintended; and the greatest care should be taken that the diet of the inmates consists of a due proportion of animal and vegetable substances, from which vegetables or cheap fruits containing a vegetable acid, or such an acid in combination with an alkali, should on no account be omitted. This precaution requires to be especially borne in mind when the potato, which answers this description, falls short.

977. 2. Hospitals, in common with buildings destined to the reception of bodies of healthy persons, ought to combine a well-selected site, a dry soil, thorough drainage, a suitable aspect, a compact arrangement of rooms and passages favourable to efficient oversight and easy communication, and an economic system of warming and ventilation. The remarks already made on site, soil, and drainage, as applicable to houses, apply equally to hospitals, and a few additional words on the subject of aspect will supply all that is required on this head.

The best aspects for the wards of an hospital are the north and south, or the north-west and south-east. The east and west aspects combine the advantages of greater cheerfulness with the drawback of the sun's glare; and the west aspect is open in summer to the objection of great heat in the after part of the day. The south aspect is the best for consumptive patients, for those suffering from diseases of the lungs, for weak and delicate persons, and for the aged. In hospitals restricted to two aspects, the direct north and south are preferable to the direct east and west. In general hospitals with a north and south aspect, the southern wards are most suitable for diseases of the chest, for aged persons, and for the weak and delicate; the northern wards for febrile and inflammatory disorders. For convalescent hospitals, the greater cheerfulness of the east and west aspects is a recommendation. The airing grounds attached to hospitals should have a southern exposure. Dispensaries and rooms for the examination of patients should face north and south, and larders and provision-stores north.

The most economical arrangement of an hospital is one which devotes the basement to the out-patient department, the dispensary, the living and sleeping rooms of nurses and subordinate officers, the kitchen and stores.

A compact arrangement of rooms and passages is best obtained in a lofty building with a large central staircase; and the most economical as well as least objectionable arrangement for warming and ventilating is obtained by a combination of open fireplaces with the thick walls of a lofty building, and windows glazed with thick glass, or with double panes of thin glass, and opening freely above and below, or tilting inwards in three or more sections. The air of the great central staircase should be warmed by open fires, and be available in bad weather for the ventilation of the wards.

As the wards of an hospital are occupied by sick persons day and night, the cubic contents per bed should be at least half as great again

as in prisons, workhouses, and barracks. For adult males, and in the case of hospitals situate in the metropolis and the larger provincial towns, it should not fall short of 1,500 cubic feet; and in fever hospitals and lying-in wards should amount to 2,000 cubic feet. A considerable reduction of space may be allowed in the case of women and children, and in hospitals occupying open situations in the smaller provincial towns.

The wards of an hospital should be lofty as well as spacious. They should have a height of 14, 15, or 16 feet, and such length and width as to give ample space around the beds. The beds arranged along the outer walls should stand in piers between two windows, and those of the inner walls opposite to them, and the corner beds should not touch the end walls. The windows should rise to within a short distance of the ceiling, and should open above and below. The number of beds in a ward must vary with the nature of the cases admitted. In civil hospitals, thirteen or fifteen beds in a ward are convenient numbers, especially as admitting of symmetrical arrangements; in military hospitals thirty beds is the number generally preferred. If we suppose an equal number of nurses or attendants, the number of beds in a ward will decrease with the severity of the cases, and *vice versâ*.

The same principles of arrangement and construction apply to military as to civil hospitals. Of camp hospitals, or of buildings used for soldiers in actual service, it may suffice to observe that the roughest weatherproof shed, provided it be spacious, is to be preferred to the most substantial building if overcrowded. This truth was distinctly proved by Dr. Brocklesby, and it is one which should never be absent from the mind of the army surgeon.

978. 3. A ship on the open sea has the solitary advantage of being surrounded by a pure air free from any injurious terrestrial emanations. In all other respects it is placed under unfavourable circumstances. It combines the drawbacks of inadequate space for the accommodation of passengers and crew and the stowage of water and provisions; of ventilation liable to frequent interruptions; of a moist atmosphere acting on vegetable matters subject to decomposition; and of the frequent incursions of a water abounding in salts (the sulphates), which by their decomposition permit the evolution of sulphuretted hydrogen gas. A ship in harbour, though in other respects placed under more advantageous circumstances, is often exposed to the most deleterious emanations from low swampy lands and rich alluvial soils. A seafaring life, moreover, is exposed to great and continuous fatigues under circumstances otherwise unfavourable to health, and, to a certain extent, and often for long periods of time, to the evils of a monotonous existence. Hence the preservation of the health of seamen and passengers by sea is only to be accomplished by the most watchful care and attention to the cleanliness, dryness, and ventilation of the ship, the supply of the crew with fresh water, and sound provisions embracing all the elements of a wholesome diet, with suitable clothes, and proper change of clothing, and with fitting exercise, occupation, and recreation.

The means to be adopted to insure these ends can only be fitly described by those who add to a general knowledge of the principles of hygiène a special acquaintance with the construction and internal economy of ships. The obvious desiderata are spacious cabins and berths, a dry and pure atmosphere, efficient ventilation, pure water, sound provisions embracing the necessary element of vegetables, fruits, or the juices of fruits, or fermented liquors obtained from vegetable substances, proper clothing, varying with the climate, with due change of clothing, the separation of the sick from the healthy, and facilities for bodily exercise and mental recreation.

979. 4. The preservation of the health of soldiers and sailors in actual warfare is a subject which can only be treated adequately in works specially devoted to it. Men engaged in offensive wars are exposed at the same time, or in quick succession, to every cause of disease except inactivity of mind and body; and even from this they are not always exempt. They are often called upon to serve in unhealthy climates and pestilential places, in the most inclement seasons, with inadequate shelter, or with no shelter at all, with short supplies of provisions, rarely of the best quality, and from which some important elements of a wholesome diet are almost necessarily omitted, exposed to every species of hardship and privation, to fatigue and want of rest, and they are sometimes tempted to dangerous excesses of riot and intemperance. When serving at a distance from home, they must often enter on a campaign with their health impaired by the confinement of a long sea voyage, and must often remain in garrisons and encampments combining the most unwholesome sites with the most imperfect sanitary arrangements. Being necessarily placed under such disadvantageous circumstances, a close attention to all the known means of preserving health and preventing disease becomes imperatively necessary. Some of the leading precautions and provisions applicable to the soldier in service may be briefly stated.

In transporting troops from place to place the same watchful care is required on board ship as in the case of sailors and passengers; and when it is possible to choose the time of the year, that should be selected which will enable the soldier to arrive at his destination at the healthiest season, and one bearing the nearest resemblance to the climate of his own country. His *clothing* should be suited to the climate and season, being of close fitting woollen materials in cold climates, and in winter; of cotton, sitting loose, and with protection for the head, in hot climates and in summer. In winter, flannel should be worn next the skin, in summer, cotton. A warm, waterproof cloak, for wet weather and night use, and strong thick shoes well fitted to the feet, with thick woollen socks, complete the necessary clothing of the soldier. In all places, and at all times, mere soldierly appearance and bearing should give place to comfort and practical efficiency. The best *bedding* for the soldier is a mattress stuffed with cork, covered beneath with waterproof cloth, and having a double flap of the same material to draw over the body. The soldier's *diet* should be as

carefully adapted to the climate as his dress. In cold climates a maximum of animal food should be provided, and spirituous liquors are least injurious; in warm climates an excess of vegetable food, and an abstinence from spirituous liquors should be enjoined; in both, vegetables and ripe fruits, or their nearest substitutes, should on no account be omitted. The soldier on the *march* should be in motion during the hours most suitable for exercise, and for avoiding the intense heat of warm climates. He might always advantageously walk three or four miles before taking his first meal; then, after rest and refreshment, enter on the principal portion of the day's march. The best food for the first meal is warm nutritious soup, or hot coffee with bread; and tea is always a grateful refreshment. The ground chosen for *encampments* should, if possible, be sloping, so as to allow of natural drainage, protected from cold winds, and, in hot climates, affording the shelter of trees. Places for the deposit of offensive matters should be chosen in reference to the prevailing direction of the wind. They are best placed on a sloping bank, upon which dry earth should be thrown day by day; the mixed soil being removed at short intervals to a convenient distance. Soldiers should not remain on the same spot for any length of time, but the site of the camp should be changed at short intervals. Proper arrangements should always be made for separating the sick from the healthy; and, in providing tents, or huts, or more substantial buildings for hospitals, the principle already laid down should be constantly borne in mind, that the very roughest shelter, with plenty of space, is preferable to the most substantial building without it.

Soldiers in *cantonments* or *barracks* often suffer severely, and are subject to a frightful mortality, in consequence of the selection of an improper site. Instead of being stationed on high sloping ground, some low-lying swamp at the mouth of a river is chosen, with the certain result of excessive sickness and a high mortality. If to this first fatal error there be added a similar neglect of other hygienic precautions, the results are most lamentable. If, on the other hand, a good choice of a site is followed up by careful attention to all the simple rules of health, the life of the soldier may be preserved even in the most unhealthy climates.

In *cantonments* and *barracks*, and on the *march*, as far as the exigencies of actual warfare will permit, the following precautions should be carefully observed. The soldier should be sheltered, as much as possible, from the heat of the day, and from the cold and dews of the night; dry, healthy spots should be chosen for military exercises; military duties should be so timed that the soldier may be deprived as rarely as possible of his natural sleep; in mounting guard, arrangements should be made to employ as few fatigue-parties as possible; the messes should be so ordered that the soldier may begin the duties of the day with a comfortable, warm breakfast; the diet should always comprise a due supply of vegetables and ripe fruits, and the canteen should be placed under stringent regulations; the means of personal cleanliness should be provided, and daily washing of the feet and fre-

quent bathing be insisted on ; flannel waistcoats or cotton shirts should be worn next the skin, and a flannel belt round the loins ; and a change of clothing should be provided and ordered after every exposure to rain. The soldier should also be subject to frequent medical inspection, especially during the prevalence of epidemics ; and he should be encouraged to engage in manly sports, should be employed to the utmost in useful and cheerful labours, and in studies calculated to occupy and amuse the mind.

The subject of Public Hygiène would be incomplete if some notice were not taken of the *dietaries* adapted to preserve the health of men, women, and children when brought together in large numbers. The subject is confessedly a very difficult one, but admits of being so treated as at least to guard against fatal errors. Perhaps, too, it may be possible to indicate what articles of food should be combined, and in what proportions, so as to constitute sound dietaries for some of the principal classes of persons who have to be fed in common.

3. DIETARIES.

980. The great pestilences of former times were always preceded or attended by famine or scarcity ; and a deficiency of food, or a failure of some important crop, such as the potato, has proved the immediate forerunner of the most fatal outbreaks of fever in more recent times. Moreover, the relation which scarcity of food bears to one form of fever is so marked as to have led the best modern authorities to speak of it as “ Relapsing, or Famine Fever.”

981. Scarcity of food, or a deficiency of some important element of a wholesome diet, has also been the immediate cause of many fatal maladies among soldiers in active service, and especially those engaged in the attack or defence of besieged places, as well as among seamen.

982. The same cause has also been in occasional operation in all establishments for the reception of healthy and sick persons—in schools, prisons, and workhouses, in barracks, and in hospitals ; and some notable and instructive examples of the danger attending large reductions in existing dietaries, and the omission from the diet-roll of some important element, especially the potato and its vegetable equivalents, have been afforded within the present century. One of the most painfully instructive of these cases occurred at Millbank prison in 1822 ; and some instances on a smaller scale in other prisons within a few years of this time (1864).

983. The principal diseases which have been directly traced to scarcity of food, or to food of an improper character, are scurvy (*purpura nautica* and *purpura hæmorrhagica*), dysentery, and diarrhœa, continued fever, and scrofula ; in infants, the disease known as *tetanus neonatorum*, and in children, *marasmus*. All those maladies which follow upon gradual exhaustion of the strength, and impairment of the constitution, must also be more or less promoted by the same cause.

984. Of the diseases just specified the one which is most certainly pro-

duced by an insufficient diet, but especially by a diet from which vegetables have been excluded, is the scurvy—a disease which fortunately makes its presence felt not merely in extreme weakness, but by the characteristic swollen, spongy, and bleeding gums, the pouring out of blood in circular spots (petechiæ), or in irregular blotches beneath the skin, and hæmorrhage from the mucous surfaces.

985. In devising suitable dietaries for the inmates of public establishments, or for bodies of persons brought together under a central management, many circumstances have to be taken into account, such as age and sex, occupation and manner of life, health and sickness, and the necessity, or otherwise, of economy in the purchase of food. A subject of such large extent can only be worthily treated by entering into details which would be out of place in this work. The establishment of a few general principles applicable to all persons alike, and subject to modifications in accordance with age and sex, health and sickness, and the demands made upon the strength by different conditions and occupations, is all that can be accomplished in these pages.

The subject will be briefly considered under the following heads:—

1. The constituents of a wholesome dietary. 2. The proportions in which those constituents should be given. 3. The quantities required by adults of either sex, and by children of different ages. And 4. The variations in quantity necessitated by condition and occupation.

986. 1. *The constituents of a wholesome dietary* have been determined partly by experience and partly by inference drawn from chemical examination of the blood, structures, and excretions of the human body, on the one hand, and of different kinds of food on the other. Experience has taught us the necessity of blending in the same dietary more than one kind of food; and has warned us in language not to be mistaken, of the danger of omitting from any dietary for any considerable length of time that vegetable element of which, in consequence partly of its abundance and partly of the convenience with which it may be stored and kept, the potato is the best representative. By chemical analysis of the blood and animal structures, we have been taught that the body cannot be built up, nourished, and maintained in health and vigour without such mixed food as shall supply it with the nitrogenous elements of muscle and skin, the carbonaceous element of fat, and the several mineral matters which enter so largely into the composition of bone, and furnish an essential element of the nervous tissue. Chemistry has also taught us that of the excretions, some (as the exhalation from the lungs) abound in carbon, others (as the urine) in nitrogen and saline matters. On the other hand, we have been taught, by the same science, that all the elementary constituents of the blood and tissues, and all the solid and gaseous elements of the excretions, exist in the food which we consume, and can be traced to it; and, further that it is possible to arrange all the varieties of food in two great classes, according as they contain or do not contain nitrogen (§ 176), the first, or non-nitrogenous class subserving the function of respiration, and contributing very largely to the production of heat; the second known

indifferently as the nitrogenous or plastic class, employed in building up, maintaining, and repairing the tissues of the body.

987. The chemical analysis of the milk by which young animals are nourished, and of the egg which performs the same office for birds, confirms the information derived from the sources just indicated; for the solid matter of milk consists of more than a third of its weight of the nitrogenous element, caseine; somewhat more than a fourth of its weight of the carbonaceous material, oil or butter; and less than half its weight of another carbonaceous element, sugar: these, with about a hundredth of its weight of mineral substances, of which by far the larger portion is phosphate of lime, being held dissolved or suspended in about eight times their weight of water. Here, too, we have a nitrogenous or plastic element (caseine), combined with carbonaceous elements in the proportion of about one to three. In the egg, again, the nitrogenous element, albumen, in the proportion of about seven parts, is blended with oily matter (a small quantity of sugar only being present) in the proportion of five parts, these matters being mixed with about three times their weight of water.

Again; chemical analysis of the vegetable substances which experience has proved to be preventives of scurvy, have shown that it is not by virtue of their carbonaceous or nitrogenous constituents that they so act, but by means of a vegetable acid (the citric or malic acid), free, or combined with potash.

988. It follows, then, from the teachings of experience, and the researches of the chemist, that a dietary to be *wholesome* and *nutritious* must contain a combination of nitrogenous or plastic, and non-nitrogenous or respiratory, elements, together with vegetables known to contain a free acid, or such an acid in combination with potash.

989. Now some articles of food in common use are rich in nitrogen, others in carbon, and others, again, contain both elements blended in proportions approximating more or less closely to the actual requirements of the frame. So that it is quite possible to construct wholesome and nutritious dietaries by very different combinations of food. One diet may consist of milk as its chief element, another of the flour of wheat or other cereal, another of meat, another of fish, another of the potato. In India rice is the staple of diet, in Ireland the potato, in Scotland oatmeal, in England the flour of wheat.

990. For practical purposes the substances most used in the dietaries of this country may be classed as nitrogenous, carbonaceous, and mixed—the nitrogenous group consisting of meat, cheese, and peas; the carbonaceous of suet, bones, and molasses, rice and the potato; and the mixed class of milk, and the flour and meal of wheat, oats, barley, and maize. The common vegetables which contain a free acid, or such an acid in union with potash, are potatoes, turnips, and carrots. Cabbage and onions have the same antiscorbutic property, but they abound also in the nitrogenous element. Milk also appears to have the same valuable property, in virtue of the free acid which sometimes exists in it, and which is always readily produced by fermentation.

991. The cheapest articles which may be readily and abundantly pro-

cured in this country are:—among the nitrogenous group, shins of beef (meat and bone together), used in making soup, butter-milk, and skimmed milk, and peas; among the carbonaceous group, bones, suet, molasses, potatoes, and rice; and among the mixed group, Indian meal, barley-meal, oatmeal, and wheaten flour.

992. This grouping has no pretence to scientific accuracy; for, with the exception of suet and molasses, the rest consist of combinations of the nitrogenous and carbonaceous elements in very different proportions, the nitrogenous group having a larger proportion only of nitrogen, the carbonaceous group of carbon, and the mixed group the two elements in proportions which peculiarly fit them to become the substantial centre or basis of a wholesome and nutritious dietary.

993. These elements of a cheap dietary are very variously combined in actual practice. Indian meal and oatmeal are usually mixed with milk into a pudding or porridge; suet with wheaten flour into a pudding; the bones and flesh of the shin of beef with onions, carrots, and pearl-barley into a nutritious soup; bread is eaten with cheese; and the potato, in the best devised dietaries, forms a part of every dinner.

994. 2. The proportions in which these, the common and chief constituents of a wholesome dietary, ought to be blended have been ascertained with some approach to accuracy by a chemical comparison of the food consumed, and the excreta discharged, by adult males of the well-fed class of persons most readily submitted to experiment. If Dr. Dalton's experiments on his own person might be taken as a standard, it would follow that an adult healthy male ought to be supplied with articles of food containing about eleven and a half ounces of carbon and an ounce and a half of nitrogen (§ 279). The nitrogen should, therefore, bear to the carbon the proportion of about one to seven, or one to eight. Vierordt expresses the wants of the adult frame somewhat differently. He says that an adult male, to keep in good condition, requires about four ounces of albuminous matter, nearly three ounces of fat, and about ten and a half ounces of amylaceous food daily. One pound of wheaten bread, one pound of potatoes, and about four ounces of meat, or its equivalent in nutritious meat-soup or cheese, per diem, would fairly meet this requirement. If it were deemed expedient to exclude the meat element, one pound of bread, half a pound of potatoes, half a pound of oatmeal, and seven pints of milk per diem, would similarly meet the theoretical requirements of the German physiologist.

995. By very general assent it has become the practice in England to supply to paupers and prisoners a dietary consisting chiefly of bread, potatoes, and meat, soup containing meat, and gruel for breakfast. A liberal, but not expensive diet for men not at hard work might be roughly stated to consist of about 275 ounces per week of food served in the solid form, and about fourteen pints in the liquid form; while for men at hard labour the quantity of solid food is generally found to exceed 300 ounces per week, the liquid food being still about fourteen pints.

996. 3. The quantities of food required by adult men and women, and

by children respectively, are not easily ascertained. One obvious consideration arises out of the weight of the classes to be provided for. Thus, the weight of an adult woman being about a sixth less than that of an adult male, it would be reasonable, if all other things were equal, to deduct a sixth from the dietaries of adult males, in order to adapt them to the use of adult females. But as the work of nutrition goes on less actively in females, and the wear and tear of their system is less, the deduction to be made may perhaps be roughly represented by a fourth of all the food served in the solid form. So also, as the weight of men or women at sixty-five or seventy years of age is about a twentieth less than the weight of adults, and their functions much less active, it would not be unreasonable to reduce the dictary of aged persons by at least a tenth.

997. The case of children offers greater difficulty; but here, too, the element of weight cannot be disregarded. A child of five years of age will weigh about a fourth, a child of seven years of age about a third, and one of fourteen not much more than half of the weight of an adult of the same sex; but as the body of the child is growing, it is obvious that it requires, in comparison with the adult, a quantity of food not to be measured by the weight alone. Hence, instead of a fourth, a child of five years might require a third of the food given to the adult, a child of seven might require a half, and a young person of fourteen as much as two-thirds. In comparing the diet of the children at the Foundling Hospital, as given by Pereira, I find that, assuming the diet of an adult to be 300 ounces of solid food, consisting chiefly of bread, potatoes, and meat, the solid constituents of the dietary of children under nine years of age amount to about five-twelfths, and above nine to about seven-fifteenths. The liquid portion of the food in these dietaries for children consists very properly of milk. In adult dietaries milk is used exceptionally.

998. 4. Of the variations in the quantity of food rendered necessary by condition of life and occupation, it may suffice to observe that, as a general rule, inaction of mind and body should imply a moderate allowance of food, and activity of mind and body a liberal supply; that bodily exertion necessitates an increase, and bodily inaction a decrease of the nitrogenous or plastic elements; and that a liberal supply of the vegetable element, of which the potato is the most convenient representative, is especially needed in men or women who lead an inactive life within doors. It is believed, too, that prisoners, in consequence partly of their long confinement, and partly of the depressing effect of imprisonment, require a more liberal diet than paupers; and that convicts with long sentences must be better fed than prisoners whose term of retention is shorter. It is probable that as the depression produced by imprisonment has been over-estimated, so also has the need of a more sustaining diet; and it is quite possible that an increase of the vegetable (potato) element would meet this exceptional case better than an absolute increase in the quantity of the food.

CHAPTER VI.

GENERAL THERAPEUTICS.

999. THE science of therapeutics treats, as the name implies, of the cure and palliation of diseases. In its widest sense, it comprises all information which has an immediate bearing upon the knowledge of disease, on the one hand, and of the virtues of remedies on the other. The application of this knowledge in individual cases constitutes the *Art* of healing.

This art of healing is every day assuming a more scientific form; and it is already possible to treat the subject as physiology and pathology have been treated in the earlier pages of this work.

1000. The scientific art of healing is beset by the same difficulties that attach to the scientific study of disease, and by others peculiar to itself. As our knowledge of disease is rendered imperfect by our ignorance of the phenomena of health, so is our knowledge of the action of remedies on sick persons impeded by the slender information we possess concerning their effects on the healthy frame. But the great obstacle to the improvement of the science and the art of healing is, the difficulty of instituting comparative trials of the efficacy of different modes of treatment in the same disease, and our necessary ignorance of the extent to which the body, if left to itself, would repair the injuries which it sustains. The physician does not feel justified in leaving disease to itself; hence he is ignorant of the nature and power of the "*vis medicatrix*:" on the other hand, he is unwilling to employ a new remedy in a disease in which an old one has been used by general consent, lest an unsuccessful or fatal result should be laid to his charge.

1001. From these considerations it follows that to form an exact classification of remedies, or to establish broad principles of treatment, is a work of great difficulty. Nevertheless, the attempt ought to be made, as general principles are the foundation of all sound practice. The difficulties that lie in the way of such an attempt will be best removed by following, step by step, the principal functions of the body, as already described in a former chapter, and endeavouring to show the effect which remedies produce upon each of them in turn. In pursuance of this plan, the following arrangement will be adopted.

(1.) Remedies applicable to disorders of the *primæ viæ*, including the treatment of disorders of the stomach, liver, and intestines. See Chapter III., Part 1. (§ 148 to 200.)

(2.) Remedies which modify the composition of the blood. See Chapter III. (§ 201 to 240.)

(3.) Remedies which affect the circulation and the functions performed by the several orders of vessels. See Chapter III., Part 2. (§ 281 to 387.)

(4.) Remedies which act upon the structures of the body. See Chapter III., Part 3. (§ 388 to 432.)

(5.) Remedies which act upon the nervous system. See Chapter III., Part 4. (§ 433 to 496.)

(6.) A sixth division will comprise an attempt at a classification of the more important remedies.

(7.) In this section a few remarks will be made on the duties of the nurse and the management of the sick-room.

1. REMEDIES APPLICABLE TO DISEASES OF THE PRIMÆ ViÆ.

1002. *Diet*.—Most disorders of the stomach require some regulation of the diet, or some direction as to the time and mode of taking food. The functional disorder of most frequent occurrence is anorexia, or loss of appetite, attendant upon almost all severe diseases, especially those of an inflammatory or febrile character. This loss of appetite always indicates a loss of power to digest food, and necessitates either entire abstinence, or the use of such articles of diet as are least irritating to the stomach; such as barley-water, toast-water, milk-and-water, and weak tea; acidulated drinks, such as lemonade and imperial; and the ripe juicy fruits, especially the orange and grape.

1003. The functional disorders of the stomach which are independent of the general system, and originate within the organ itself, are known as acute and chronic dyspepsia. The *acute* form requires a diet free from all matter which can irritate the tender membrane of the stomach; such as gruel, arrow-root, or sago, made with or without milk, to the entire exclusion of all solid matter, whether animal or vegetable. The *chronic* form requires a close attention to the time and mode of taking food, the quantity and quality of the food itself, and the state of other parts of the alimentary canal and of the abdominal viscera, especially the liver and large intestines. Complete mastication of the food, the use of a moderate quantity of liquid, similar moderation in the quantity of solid food, and in the use of condiments, and moderate intervals between meals, are points which should always be insisted on. The particular kind of diet suitable to each patient is, to a certain extent, a matter of experience, and symptoms (such as palpitation with an irregular or intermitting pulse) have sometimes been removed by omitting some single article, such as tea, from the diet-roll; or by substituting unfermented for fermented bread.

1004. In organic diseases of the stomach, the same abstinence from solid and irritating matters is indicated as in acute dyspepsia; but such substances must be administered as nourish, at the same time

that they are free from irritating qualities; such as strong broths, soups, and jellies. When the stomach is altogether unable to retain food of the least irritating kind, and in the smallest quantities, life may be prolonged by nourishing euemata; and a small quantity of nourishment may be introduced by friction through the skin, or by local baths of warm nutritious liquids.

1005. Another point to be attended to in regulating the diet of patients is, to give them food suitable to their age. This caution requires to be especially observed in the diseases of children, in whom the stomach is easily disordered by food ill adapted to their years and strength. Hence solid food of all kinds is apt to disagree with very young children; and the disorder of the stomach and bowels which it occasions gives rise to infantile remittent fever, develops the scrofulous taint, and, if unchecked, terminates in hydrocephalus or mesenteric disease. For children who suffer in any of these ways, a strict regulation of the diet, an abstinence from every kind of solid food, and, in extreme cases, a recurrence to the diet of the infant at the breast, substituting for the milk of the mother, asses' milk or new milk from the cow, and administering it, if necessary, in small quantities, and at long intervals, are indicated. This simple treatment, aided by the steady use of aperients when required, is often attended with the best effects, after nourishing and stimulating food has wholly failed.

1006. The disorders of the stomach which have been just described affect chiefly the *reducing* function of the organ. When the *converting* function is disordered, the diet must be regulated according to the nature of the existing disorder. In cases of diabetes mellitus, for instance, where an unusual quantity of sugar is excreted by the kidney, it is usual to prescribe such a diet as is least convertible into saccharine matter. The saccharine staminal principles, therefore, are given in small quantity, and the diet is made to consist chiefly of albuminous and oleaginous elements. The substitution of gluten bread for common bread is also believed to be indicated in this disease. It should be borne in mind, however, that all these restrictions of the diet in diabetes are dictated by a theory, the soundness of which is open to doubt, that when we are unable to attack the cause or source of the disease, it is beneficial to render difficult or impossible the development of its leading symptoms. It is at least possible that a patient suffering from diabetes may thrive as well on a diet which supplies the elements of sugar, as on one that withholds them. To prescribe sugar itself is to push this theory to an unjustifiable limit.

1007. A similar, but a less strict, attention to diet, is necessary in the subjects of the oxalic diathesis, in whom it may be sufficient to prevent the use of sugar in its crystallized form.

1008. A strict attention to diet is necessary, not merely in disorders of the stomach, but as a means of inducing certain states of the general system. The influence which a particular diet exercises upon the health is well exemplified in the opposite systems of training

practised in preparing men for the exercises of the ring and of the turf. The physician, likewise, resorts to a certain kind of diet, with a view of imparting or reducing strength: allowing a nourishing diet to the convalescent, and restricting the patient labouring under a severe inflammatory or febrile attack to substances containing little or no nutriment. This latter, which is called the *antiphlogistic* diet or regimen, must be more or less strict, according to the severity of the disease in which it is prescribed. In cases of the more severe kind, total abstinence from food may be necessary, liquids being allowed according to the existing degree of thirst: in less severe and urgent cases, the patient may be restricted to a vegetable diet, which has little effect on the circulation.

1009. During convalescence from acute diseases, it is necessary to pass with caution from the abstinence of the strict antiphlogistic regimen to vegetable diet, from that to fish or light broths, and then to meat in moderate quantity, beginning with mutton, as most easy of digestion. The regulation of the diet during convalescence is of much importance, and requires a strict attention, on the one hand, to the powers of the stomach, as tested by the appetite, and the effect of the food already prescribed; and, on the other, to the state of the circulation, as evidenced by the pulse.

1010. The physician should bear in mind that vegetable food has little or no effect on the circulation, but that animal food stimulates, that warm liquids excite, while cold liquids act as sedatives, and that food produces its greatest effect on the circulation in the early part of the day. The knowledge of these facts should be acted on, especially in cases of slow and unsteady convalescence; that is to say, in those cases where debility is accompanied by some remains of local affection, where the appetite is variable, and that condition of the general system exists known as "irritation." On the other hand, when the patient, though weak, is free from disease, when the appetite is good, and the circulation tranquil, food may be administered with less caution.

1011. But there are cases in which a nourishing and even stimulating diet is necessary, though local inflammation and constitutional irritation be present. To this class belong debilitating discharges, and extensive injuries in course of reparation, requiring a more abundant supply of nourishment than that which the stomach, if left to itself and guided by the existing appetite for food, would be able to supply. Here we must combine the stronger and more stimulating kinds of solid food with the nutritious and stimulant liquids, wine, ale, porter, &c. In such cases, too, the previous habits of the patient must be attended to, and the drunkard must be supplied with his accustomed stimulus.

1012. It may be well in this place to insist on the general rule that where diet is equally efficacious with medicine, it should have the preference: for the duty of the physician is not to cure disease by physic, but to cure it by all the means which are within his reach;

and the more simple the means, the stronger their claim upon his notice.

1013. Diet forms but a part of the remedial means which we have at command in treating diseases of the stomach. For acute affections of the mucous membrane of the stomach, indeed, diet alone will often prove a sufficient remedy, though it may occasionally be necessary to resort to leeches or blisters to the epigastrium; but for those affections known as chronic dyspepsia, medicines are required in addition to the regulation of the diet.

1014. Many substances, which have the effect of increasing the appetite and the powers of the stomach, are in common use as *condiments*. Of these, common salt is the only one absolutely required; for experiment has shown that animals deprived of this simple condiment soon perish, however nourishing their food may be in other respects; and one of the severest punishments to which man has ever been subjected, is a diet from which common salt is excluded. When, however, the diet consists principally of vegetable food, the use of spices is to be commended, as promoting digestion.

1015. Almost every substance possessed of active properties produces some effect upon the mucous membrane of the stomach, and by far the majority increase its vascularity, the flow of its secretion, and the contraction of its muscular coat. All the rubefacients, for instance—that is to say, all those substances which inflame the skin, inflame the mucous membrane of the stomach also; and many substances which have not power enough to act upon the skin through the cuticle, affect the more delicate and less protected mucous membrane of the stomach. In small doses, these substances increase the appetite and strengthen the digestion; when long continued, they produce congestion and debility of the capillaries; and when given in large doses, they act as emetics. Thus common salt, which in moderation is the best and safest condiment we possess, when given in large doses produces sickness, and in still larger ones, acts as an irritant poison. The same observation applies to mustard, horseradish, pepper, and garlic.

1016. There is reason to believe that almost all substances, whether derived from the vegetable or mineral kingdom, act upon the stomach nearly in the same way. For instance, a quarter of a grain of arsenic or a grain of tartar-emetic, or a scruple of sulphate of zinc, or the same dose of ipecacuanha, will not produce vomiting more effectually than a table-spoonful of mustard, or twice the quantity of common salt, or a large draught of warm water. On the other hand, a thirtieth of a grain of arsenic, or the twelfth of a grain of tartar-emetic, or one or two grains of zinc, or the same dose of ipecacuanha or squill, will as surely increase the appetite as half a tea-spoonful of salt or mustard, or a small draught of warm water. In choosing, then, between the substances which act as emetics in large doses, and as gentle stimulants in small ones, we prefer those which produce the least injurious effect upon the constitution; and these are the substances which experience

has pointed out as the best and safest condiments. A list of them would comprise all the stimulant and aromatic herbs used in cookery, as well as many substances employed in medicine. Under different names and variously combined, they are all given either as independent remedies in dyspepsia, or to qualify remedies directed to other organs. Thus we combine mint, or ginger, or cloves, with saline purgatives, ammoniacum with squills, galbanum with aloes, the essential oils with many different kinds of aperient pills.

1017. The simple, the warm aromatic, or the astringent, bitters, under the names of aromatics, stomachics, carminatives, or cordials, are the remedies most frequently employed with a view of increasing the appetite, or causing the muscular fibres of the stomach to contract. Ginger, mint, and cardamoms are among the best remedies of this class.

1018. *Emetics*.—Any of the remedies just enumerated, given in large doses, are emetics. Those in most common use are ipecacuanha, tartar-emetic, and zinc; and mustard or common salt are often used on an emergency, when other emetics are not at hand. It is usual to promote the action of these substances by copious draughts of warm water, and by tickling the throat with a feather. Emetics are commonly prescribed, merely with a view of emptying the stomach; occasionally they are used for this purpose in the beginning of febrile affections, and they are administered frequently, and at short intervals, with good effect, in incipient cases of phthisis pulmonalis, and in bronchitis accompanied with profuse expectoration. They have also proved an efficient means of producing reaction in the collapse of Asiatic cholera. Common salt, in the dose of three table-spoonfuls to a quart of water, has been administered in that condition with the best result.

1019. The stomach becomes less sensible to the effect of stimulants if often repeated: so that what was an emetic at first becomes a promoter of digestion; while a more gentle stimulant loses its effect entirely by repetition. Thus, a cigar, to a person unaccustomed to smoke, will cause vomiting; but, after many repetitions, it becomes an effectual promoter of digestion. The same thing occurs in disease during the administration of tartar-emetic: the first few doses will often cause sickness; but ere long the stomach becomes accustomed to its use, and, if continued, it produces that amount of stimulation which is favourable to digestion.

1020. The remedies which have been mentioned, though differing but little in their direct action on the stomach, vary greatly in their remote action on other organs of the body. Some of them belong to the class of stimulants, others to that of tonics, and the most active are strong irritant poisons.

1021. All the medicines just enumerated produce, according to their dose, a determination of blood to the mucous membrane; and there are probably few which cause contraction of the capillaries.

Cold liquids and ice are the most effectual remedies of this sort, and are therefore well adapted to combat severe inflammation of the stomach, or active hæmorrhage from its surface. In the more chronic forms of determination of blood, and in passive hæmorrhage, nitrate of potash in full doses may be administered with advantage.

1022. Neuralgic pain of the stomach (gastrodynia), is often effectually removed by bismuth, zinc, and oxide or nitrate of silver, and troublesome sickness by creasote. This symptom is, however, often effectually relieved by dilute hydrocyanic acid—a remedy belonging to a different class.

1023. *The Liver*.—The functional disorders of the *liver*, which consist in a diminished secretion of bile, are most effectually treated by small doses of mercury, or by the nitro-muriatic acid. This latter remedy is sometimes applied externally, as a foot-bath. Another remedy sometimes given, with the same object of promoting the secretion of the bile, is taraxacum.

Intestinal Canal.—The chief functional disorders of the intestinal canal are diarrhœa, hæmorrhage, and constipation.

1024. *Diarrhœa*, like dyspepsia, may be acute or chronic. Acute and recent diarrhœa, like acute gastritis, may always be removed by a farinaceous diet, from which all solid and irritating matters are excluded. Chronic diarrhœa, arising as it does from a congested state of the mucous membrane, may be cured most effectually by removing that congestion. This is effected by small doses of mercurial preparations, which, acting on the liver, increase the secretion of the bile, and unload the branches of the vena portæ. Where this treatment fails, which it rarely does, and probably only where the mucous membrane is in an extremely relaxed state, astringents may be resorted to, as chalk mixture, aromatic confection, catechu, kino, tannin, &c. When these fail, stronger astringent minerals, as sulphate of copper, in combination with opium, may prove successful, and nitrate of potash sometimes succeeds where these have failed.

1025. Dysenteric diarrhœa, which is characterised not by profuse mucous discharges, but by scanty and teasing evacuations of a gelatinous substance, or of mucus mixed with blood, is best treated by full doses of castor-oil combined with laudanum. Small doses of some mild mercurial preparation, given two or three times a-day, so as to act on the liver, and free the circulation through the portal vessels, may be necessary in chronic cases. The dysentery of warm climates, and of armies, is a disease which varies greatly in different cases, and in different epidemics, sometimes being highly inflammatory, and requiring antiphlogistic treatment, sometimes combined with scorbutic symptoms, and with a degree of debility contra-indicating all active antiphlogistic measures.

1026. *Hæmorrhage* from the intestines (melæna) requires the same treatment as chronic diarrhœa—viz., small doses of mercurial prepara-

tions, to increase the secretion of the liver, and unload the vena portæ, combined with an unirritating diet. This treatment will be equally effectual, whether the blood come, as some suppose, from the liver itself, or from the surface of the intestines.

1027. Another form of hæmorrhage from the bowels occurs in dysentery; blood is also passed from internal or external piles; and occasionally florid blood is discharged in large quantity from the open mouth of a single artery. Ipecacuanha and opium have been found eminently serviceable in dysentery. Piles are most effectually relieved by unloading the bowels, by promoting the secretion of the liver, by the local abstraction of blood, and the local application of warm or cold water, according to the experience of the patient. The last-named form of hæmorrhage is detected by the use of the speculum ani, and cured by the application of nitric acid to the bleeding vessel.

1028. *Constipation*, as it arises from many causes, requires many remedies. The substances which naturally promote the action of the bowels are those which escape the action of the stomach, and are not convertible into nourishment; such as the cuticle and spiral vessels of vegetables, the hard covering of seeds, the tendons and gristle of meat. Where these are carefully removed in the process of cookery, constipation is apt to arise, and may often be removed by restoring some of these indigestible substances to the food. Thus, brown bread will often prove an effectual laxative. Constipation is also apt to occur in persons of sedentary habits, and to disappear under active exercise.

1029. The medicines which act upon the bowels are all those that cause vomiting when taken into the stomach, as tartar-emetic, tobacco, sulphate of zinc, ipecacuanha, squills, &c., and the whole class of irritant poisons. It is probable that all purgatives given in sufficiently large doses would act as emetics, just as all emetics given in too small doses to produce vomiting, when they pass into the bowels, act more or less energetically as purgatives. Many of those substances, however, which act as violent purgatives, have little or no effect on the stomach.

1030. Purgatives act in two ways—by promoting the secretion of the mucous membrane, and by increasing the peristaltic action of the intestines; but some act slightly in one of these ways and energetically in the other. Those which excite abundant watery discharges are called *drastic* or *hydragogue cathartics*.

1031. Purgatives are of various kinds, and may be divided into groups or classes; as the mild cathartics or *laxatives* (manna, cassia pulp, tamarinds, prunes, honey, bitartrate of potash, and the fixed oils, as castor, almond, and olive oils); the *saline* or antiphlogistic purgatives (sulphates of soda, potash, and magnesia); the milder acrid purgatives (senna, rhubarb, and aloes); the strong acrid purgatives (as jalap,

scammony, black hellebore, camboge, croton oil, colocynth, and elaterium); and, lastly, the mercurial purgatives (as the hydrargyrum c. cretâ, the pilula hydrargyri, and calomel).

1032. We make choice of one or other of these remedies, according to the object which we have in view. If we wish simply to relieve the bowels, we prefer the compound rhubarb, or compound colocynth pills, or combinations of aloes with rhubarb or ipecacuanha; if to promote the secretions of the whole course of the intestinal canal, we use the gentle laxative; if to reduce inflammation, the saline; if to overcome obstinate constipation, the stronger purgatives; if to remove dropsical effusions, the drastic or hydragogue cathartics; and if we desire to promote the secretion of the liver, we combine the mercurial purgatives with those adapted to fulfil other indications.

1033. The choice of purgatives is not more important, however, than the mode of administration. When the bowels have been long overloaded, and especially when the local irritation has affected the nervous centres, it is important to remove the load from the intestines without increasing the mischief already existing; in other words, hypercatharsis must be carefully avoided. Here we must not only select such purgatives as effectually remove the feculent matter, but watch their operation from day to day; and as soon as any signs of intestinal irritation make their appearance, we must withdraw our purgative, and treat the hypercatharsis by a farinaceous diet, as if it were diarrhœa produced by any other irritating cause.

1034. In cases of extreme irritability of the stomach or bowels, we may relieve the intestines by enemata, consisting of warm water, or gruel with or without an admixture of common salt; or we may employ, in the same way, any of the ordinary aperient remedies. We may also act on the bowels by rubbing into the skin of the abdomen croton oil combined with castor oil. The shock of cold water on the surface of the abdomen, or the electric spark, will also produce a purgative effect; the former is sometimes employed with advantage in cases of obstinate constipation.

Enemata containing turpentine or one of the essential oils, such as the oil of rue, are often administered with great advantage in the painful flatulent distension of the abdomen which occurs in many cases of fever as well as in other states of the system; and they are found to be most effective when thrown up into the bowels by the long elastic tube.

Enemata of salt dissolved in gruel are also often administered for the removal and cure of worms, especially of the thread-worm. They are of less service in the other forms.

2. REMEDIES WHICH MODIFY THE COMPOSITION OF THE BLOOD.

1035. Every article of food, and all poisons and medicines (even those which are least soluble), find their way into the blood. Those sub-

stances which enter naturally into its composition, when taken in quantities proportioned to the wants of the frame, are used in building up the fabric of the body ; but when taken in excess, they are changed in composition, and eliminated by one or other of the excreting organs. Poisons and medicines, in like manner, mixing with the blood, are circulated with it, and are discharged in the excretions. But as this discharge of matters extraneous to the proper composition of the blood takes place gradually, and often very slowly, those matters are brought into contact with the textures of the body ; and when the dose is large, or often repeated, continue to be circulated through them for considerable periods of time.

1036. In the treatment of disordered states of system and of diseases properly so called, we sometimes aim at a cure by administering articles of diet or medicines which have the effect of supplying some defective element of the blood, and sometimes purposely introduce a substance foreign to its composition, which experience has shown to possess the power of destroying or counteracting some injurious or poisonous material to which the diseased condition owed its origin. The substances of the first order are very properly termed *Restoratives* ; those of the second order have received the less unexceptionable designation of *Catalytics*.

1037. *Restoratives*.—The class of restoratives may be distributed into two sub-classes.

(1.) One sub-class comprises water and every species of wholesome food, when the body is from any cause reduced to a state of disease or disorder from the want of them. Thus water has the virtue of a medicine after long marches, in starved and wounded persons, in some forms of poisoning, in profuse discharges of blood, and in diseases accompanied by excessive secretion of fluid ; and there are cases in which a limited use of water may act beneficially. A nutritious animal and vegetable diet is as medicine to the convalescent ; a spare diet, consisting chiefly of vegetables, to the plethoric and gouty patient. Fresh vegetables and ripe fruits are a *panacea* in scurvy ; fatty and oily substances of some service in phthisis ; animal and vegetable matters not containing sugar, and not easily converted into it, are to be preferred in diabetes mellitus ; sugar in a crystallized form is forbidden in the oxalic acid diathesis, and fatty matters are contra-indicated in disease of the pancreas.

(2.) Another sub-class consists of those medicines properly so called which supply an element wanting to the blood. Such a medicine is iron and its preparations in anæmia and in allied states of system ; such are alkalies and acids respectively when from the acid or alkaline condition of the urine it is inferred that there is an excess of acid or of alkali in the blood. The whole class of vegetable tonic medicines, of which quinine is the most important, is believed by some authorities (see Headland on the Action of Medicines) to act favourably in states of debility by supplying to the blood an element closely allied in composition to the *taurin* of the bile.

1038. *Catalytics*.—The medicines of this class are believed to possess the property of destroying or neutralising certain morbid poisons existing in the blood. Thus mercury destroys or neutralises the syphilitic poison, especially when it is recently introduced into the system; and iodide of potassium works the same effect when the same poison displays itself in secondary symptoms, and particularly when the periosteum is the part affected. Again, mercury, in an eminent degree, and the fixed alkalies in a less marked manner, possess the power of checking inflammation, which power is attributed, at least in part, to their well-known property of rendering the fibrin of the blood more soluble. The nature of the change which arsenic produces in the blood is less obvious, though its efficacy is undoubted; and the same observation applies to iodine and antimony.

1039. The more active medicines which are known to exert a power over inflammation also excite inflammation when locally applied; and it admits of question whether this power is due to some change brought about in the blood of the part, or to a change in the state of the capillary vessels produced by the action of the medicine dissolved or suspended in the blood. The same difficulty presents itself when we try to explain the effect of the same medicines taken by the mouth and thus introduced into the general circulation. In the next section this class of medicines will be treated as acting on the capillary vessels. In this place it must suffice to observe, that the class of catalytic medicines has been distributed into no less than eight sub-classes, according as they have the power of counteracting inflammation, neutralising or destroying the poison of syphilis, promoting the absorption and dissipation of scrofulous deposits, correcting the state of the fluids in gout and acute rheumatism, curing scurvy, curing ague and other intermittent disorders, curing convulsive maladies, and proving more or less beneficial in diseases of the skin.—(See Headland on the Action of Medicines.)

3. MEDICINES WHICH ACT ON THE ORGANS OF CIRCULATION.

1040. We recognise four distinct states of circulation in healthy persons, in disease, and under the operation of medicines, of which states of circulation the character of the pulse affords the best indication. 1. Increased frequency of pulse with increased force and fullness; 2. Increased frequency of pulse with diminished force and fullness; 3. Diminished frequency of pulse with increased force and fullness; 4. Diminished frequency of pulse with diminished force and fullness.

1041. In health, the first state of circulation is brought about by violent exercise, by spirituous liquors, and by other stimulants; the second, by those strong mental emotions and impressions which, in excess, give rise to syncope; the third attends exhaustion and sleep; and the fourth is commonly observed in the less healthy inhabitants of large towns, and in those who lead sedentary lives.

1042. In disease, the first state of circulation is present in acute inflammation or high inflammatory fever; the second, in all diseases attended with extreme debility; the third, in some cases of hysteria in women, and in some cases and certain stages of apoplexy; and the fourth, in persons predisposed to, but not actually suffering from, pulmonary consumption, as well as in those who are recovering from fever, diphtheria, and other exhausting maladies. This slow and weak pulse has also been present in some epidemics of fever and of the febrile exanthemata.

1043. The same conditions follow the operation of remedies; the frequent, full, and strong pulse is produced by spirituous liquors, by ammonia, and by other diffusible stimulants; the frequent, small, and weak pulse by tartar-emetic, tobacco, lobelia inflata, and aconite; and the infrequent pulse, of varying size and force, by opium, digitalis, conium, stramonium, and other allied remedies.

1044. In the cases specified—that is to say, in health, in disease, and under the operation of remedies—supposing the several states to be produced in the same person, with the same quantity of circulating fluid in his body, it is obvious that in a given time more blood will traverse each organ in the first case; a less quantity in the second case; a variable quantity, sometimes more, sometimes less, in the third case; and a smaller quantity in the fourth case.

1045. In the first case, the quantity of blood traversing each organ is increased in two ways; by the increased frequency of the heart's beat, and the increased quantity of blood sent out at each contraction of the ventricle; in the second case, the quantity of blood passing through each organ is diminished, because the quantity of blood sent out from the heart is lessened more than the number of beats is increased; and in the third and fourth cases, the heart sends out in the one more, in the other less, blood than will compensate for the diminished number of its beats.

1046. The remedies which augment the frequency as well as the force of the heart's contractions are called *stimulants*; those which augment their frequency and diminish their force are called *depressants*; those which produce diminished frequency with increased or diminished force are termed *narcotics* and *sedatives*.

1047. *Stimulants* (*incitants* or *excitants*).—The state of the circulation, as indicated by the pulse, being made the test and measure of the effect of remedies, those remedies are stimulants which increase the frequency, as well as the force, of the heart's contractions. There are exceptional cases, however, in which stimulants lessen, in lieu of increasing, the number of the heart's contractions.

1048. This excited state of circulation is brought about by the agency of the nervous system, whatever the part to which the stimulant is applied; and the change thus produced in the condition of the nervous centres is reflected back upon the heart and organs of circulation. If, for instance, a stimulant, such as brandy, be taken

into the stomach, the impression produced upon its nerves is conveyed either directly to the heart through the branches of the solar plexus, or to the brain and spinal cord, whence it is reflected upon the heart; or being absorbed into the circulation, it may be applied directly to the nervous centres, or to the nerves supplying the lining membrane of the heart itself. Here there are many possible ways in which the circulation may be affected; but a more simple case is that of exercise, the most powerful stimulant of the healthy frame. The effect of exercise on the circulation is in part mechanical, but it also arises, in part, from the reflection of nervous influence upon the heart in common with the voluntary muscles of the body. Again, the effect of heat applied to the skin, though partly due to the determination of blood to the surface, is in some degree dependent upon the excited state of the nervous system.

1049. The local effects of stimulants on the healthy body are due to the increased quantity of blood sent to every organ of the frame. The rapid and abundant circulation through the lungs leads to a more frequent respiration, and a more complete decarbonization of the blood: the increased flow of arterial blood to the brain excites all its functions; the impressions on the senses are more acute, the flow of ideas more rapid, volition stronger and more prompt, the passions excited, the feelings joyous: the capillary circulation is increased; and the glandular structures pour forth their secretions: the involuntary muscles, too, partake of the general excitement, and the functions dependent upon them, such as digestion and defæcation, are performed with increased vigour.

1050. Such are the effects of stimuli given in moderate quantity: in excess they act as depressants or narcotics. Thus spirituous liquors, in moderate doses, produce all the effects which have been described; but large doses give rise either to collapse or to narcotism; in other words, they occasion vomiting, extreme debility, a cold sweat, a frequent and small pulse; or symptoms of apoplexy, with oppression of all the functions, paralysis of the voluntary muscles, an infrequent beat of the heart, or a quick, full, bounding pulse. The first effect is commonly produced in persons unused to the action of the stimulant; the second, in those accustomed to it. Similar effects are produced by chloroform and the æthers; but with them, narcotism is the rule and collapse the exception. The action of ammonia is more purely stimulant than that of either alcohol or æther.

1051. It may be laid down, then, as a general rule, that stimuli carried to excess produce exhaustion of the nervous power, and that this exhaustion may display itself in one of two ways—in depression or oppression; in debility or coma.

1052. It has been stated (§ 1047) that increased frequency, fulness, and force of pulse is the test of the action of stimulants, but that there is one case in which the test does not apply. It is the case of debility, without local disease, characterised by a small and frequent pulse,

which loses frequency and gains force under the use of stimulants. It has also been stated elsewhere (§ 474), that the effect of stimulants on a pulse rendered infrequent by debility without local disease, is much less than that produced on the pulse of healthy persons,—a fact easily explained by the exhaustion of the nervous system which attends debility, and renders it dead to all impressions from within or from without. If stimulants administered in this state of debility lower the pulse, they act favourably; if they raise it much, they do harm. In the one case, they act as tonics; in the other, they merely impart momentary strength, to be followed by depression proportioned to the previous excitement.

1053. As the question whether we shall or shall not administer stimulants in certain diseased conditions is one of extreme importance, it may be well to enter a little more minutely both into the signs which indicate the expediency or necessity of resorting to them, and into those which serve to prove that we were justified in administering them. The conditions of system which especially demand the exhibition of stimulants, are, 1. The fainting state. 2. The permanent state of exhaustion brought on by loss of blood, the long continuance of profuse discharges, prolonged abstinence from food, the use of an innutritious diet, and mental or bodily fatigue. 3. The state of exhaustion which supervenes in the course of febrile disorders, which assume the typhous or adynamic type: and 4. The state of exhaustion that ushers in many severe diseases.

(1.) The fainting state, however produced, whether by sudden loss of blood, by violent or prolonged exertion, by exposure to a heated and impure atmosphere, by intense mental emotion, by the temporary cessation of the heart's action in organic diseases of that organ, or by the operation of large doses of certain poisons, as prussic acid, and the vapour of æther and chloroform, demands the same treatment; namely, the shock of cold water proportioned to the urgency of the case, and the diffusible stimulants, ammonia, æther, and alcohol in the form of the stronger spirits.

(2.) The permanent state of exhaustion brought on by loss of blood, by the long continuance of profuse discharges, or by any of the several causes just specified—a state indicated by extreme pallor of the face, skin, gums, and tongue; small, quick, and frequent, or small, frequent, and irregular pulse; hurried respiration, with frequent sighing; great nervous irritability; and, in some cases, delirium—demands the continued and persevering use of those less diffusible stimulants which combine alcohol in variable proportion with a certain quantity of nourishment, such as porter, ale, wine, and brandy. The quantity, strength, and repetition of the stimulant must be proportioned to the degree of exhaustion. It will generally be expedient to combine a narcotic with the stimulant, in which case laudanum is obviously indicated.

(3.) That state of exhaustion which supervenes in the course of febrile disorders assuming the typhous or adynamic type (to which

class belong typhus and typhoid fever, many cases of the febrile exanthemata, measles, scarlatina, small-pox, and erysipelas, the remittent fever of children, puerperal fever, pneumonia, and the irritative fever following severe surgical injuries), also requires the use of stimulants. The extreme degree of this state of exhaustion is so well marked by the position on the back, the sinking of the body towards the foot of the bed, the picking of the bed-clothes, the low muttering delirium, and the involuntary discharges, that there can be no difficulty in deciding that stimulants are necessary. But long anterior to this stage of extreme exhaustion and collapse stimulants may often be given with the greatest advantage. Nevertheless the symptoms may at that earlier period be such as to excite a doubt of the propriety of administering these remedies: the skin may be hot and dry, the tongue covered with a dry fur, the breathing quickened, the pulse frequent and sharp with some degree of fulness, the countenance dusky, the vessels of the eye injected with dark blood, the patient restless and delirious, his movements indicating a considerable amount of muscular strength. In this state of things it may become a grave practical question whether stimulants ought or ought not to be given, and our doubts can only be decided by actual experiment, and careful observation of the patient before and after the use of the stimulant. The best mode of procedure is first to examine and count the pulse: then having caused the patient to swallow a glass of wine, to examine and count the pulse afresh. If it should become more frequent, and increase in hardness and sharpness, the stimulus is unsuitable. If, on the other hand, the pulse fall and becomes decidedly slower and softer, we were justified in the use of the stimulant, and may safely prescribe its cautious repetition. If after an interval of a few hours, during which we have persevered in the use of stimulants, we find the pulse less frequent, slower, and softer, the tongue becoming moist, the skin cooler and moistened with perspiration, the breathing deeper and slower, the countenance less dusky, the eye more clear, and the restlessness and delirium abated, we have every reason to persevere in the course of treatment on which we have entered. A sign much insisted on by Dr. Stokes, as decisive of the necessity for stimulants, is the condition of the heart. As this organ partakes of the weakness which affects the entire muscular system, its pulsations become extremely feeble, and the first sound almost imperceptible. The beneficial operation of stimulants is therefore indicated by increased force of impulse, and renewed distinctness of sound. As the one condition of the heart indicates the necessity for stimuli, so does the other justify the use of them. Where, then, the pulse itself does not furnish satisfactory indications, the ear or the stethoscope applied to the region of the heart may assist us in our decision.

(4.) That state of exhaustion which commonly supervenes in the advanced stages of continued fever, and in other diseases which have put on the typhous type, is sometimes present in the early stages of the same maladies. The effect on the system of the poison of the several infectious and contagious disorders is sometimes nearly allied to a state

of collapse. The patient is extremely weak, and subject to faint on the slightest exertion, the countenance is pale, the surface cold, the pulse frequent, full, quick, and extremely compressible, and the respiration hurried. In this state also it may be a question whether stimulants ought to be employed, and actual experiment alone can decide the question. If the effect of the stimulant be to lower the pulse and render the breathing less frequent, we are justified in prescribing its repetition, taking care, at the same time, to be on the watch for the reaction which in many cases follows this state of depression.

1054. *Tonics*.—These remedies, as the name implies, are given in states of debility, and specially in convalescence from exhausting maladies, with a view of restoring firmness, strength, and *tone* to the entire frame. When the body is extremely weak, stimulants have the effect of imparting real strength; in other words, they become tonics. In less degrees of debility, they produce less obvious effect than on the robust and healthy. Again, stimulants in large doses become tonics in small ones. But the class of remedies to which the term *tonics* is commonly and properly applied, have the property of gradually restoring the strength without stimulating the system. One class of tonics owes its virtues to its power of supplying a deficient element of the blood, namely, the preparations of iron. The good effects produced by the remainder of the class (such as bark, and its active principle quina), are not so readily explained.

1055. *Depressants*.—This name is here used to distinguish a class of remedies which has the effect of rendering the pulse frequent, small, and weak—the exact reverse, therefore, of the action of stimulants. This change in the circulation is accompanied by great prostration of strength, nausea, cold sweats, and all those symptoms which characterise approaching syncope. It is brought about by the abstraction of blood, by the preparations of antimony, by tobacco, aconite, and the lobelia inflata, and by the less active remedies, ipecacuanha and squills.

1056. The loss of a large quantity of blood, or the rapid removal of a smaller quantity, brings about syncope, or a state approaching to it; and as during this state the heart sends out a comparatively small quantity of blood, and that which it does send forth is propelled with little force, that part of inflammation which consists of an increased action of the heart is removed by the abstraction of blood.

1057. Tartar-emetic, which, next to bleeding, is our sheet-anchor in acute inflammation, and one of the most powerful and safe remedies in the *Materia Medica*, brings about the same condition as that produced by bleeding, and may be employed either alone or in combination with blood-letting in the treatment of all *acute* inflammations. Tartar-emetic is the only depressant of acknowledged power and efficacy which acts simply as a depressant; for tobacco and the lobelia inflata, which produce a very similar effect, in some respects, combine the properties of a narcotic and a depressant.

1058. As there is an exception to the rule that stimulants increase the frequency and force of the pulse, so is there an exception to the rule that depressants increase its frequency while they diminish its force. Thus, blood-letting, which belongs to the order of depressants, will render the pulse full and strong, and even increase its frequency, in certain cases of plethora, when the circulation is oppressed with blood, and in pneumonia, when the powers of the system are oppressed and the circulation impeded by obstruction to the important function of respiration. Again, in cases of acute inflammation accompanied with high inflammatory fever, bleeding or tartar-emetic will lessen the frequency and force of the pulse at the same time. In all these cases, however, the *modus operandi* of these remedies is essentially the same; it appears to be different merely because the circumstances in which the remedies are employed vary.

1059. *Sedatives*.—These remedies differ from stimulants and depressants, inasmuch as they do not increase the frequency of the pulse, but, on the contrary, diminish it. The true sedatives sometimes produce sleep, but they as frequently occasion wakefulness; they differ from the pure narcotics inasmuch as in large doses they cause delirium, or a state nearly resembling delirium tremens, while the narcotics in large doses occasion coma and apoplexy.

1060. Hydrocyanic acid, digitalis, and aconite are the principal remedies of this class, to which may be added the powerful remedy, cold. Hydrocyanic acid, digitalis, and aconite lower the pulse, although they bear no resemblance, in other respects, to narcotics. It is true that there are states of system in which these remedies will increase the frequency of the pulse, just as there are states of system in which the effect of stimulants and depressants on the circulation is reversed. Digitalis, for example, which, administered in diseases accompanied with a frequent pulse, lowers it in a remarkable degree, and often reduces it much below the healthy standard, in some healthy persons, and perhaps in all, has the reverse effect.* The effects of hydrocyanic acid are more constant; but exceptions doubtless exist to the rule of its operation.

1061. *Cold*, according to the degree and manner of its application, acts in very different ways. Its general effects on the circulation depend upon its intensity. A moderate degree of cold applied to the general surface acts as a stimulant; but when the skin is hot and dry it reduces the temperature, lowers the circulation, soothes the nervous system, and disposes to sleep. Applied to the head, in the form of cold lotion or of ice, it is one of the most valuable remedies in inflammatory affections of the brain. Its application to other parts of the body is of the greatest service in local inflammation or hæmorrhage. Cold is applied to the throat internally or externally in scarlatina anginosa, and ice may be swallowed in hydrophobia with great relief to the symp-

* See the experiments made by Dr. Saunders on his own person, and detailed in his work on Consumption.

toms. Applied locally, in the form of *douche*, it restores the contractility of the capillary vessels, and by preventing further effusion, allows the absorbent vessels to remove any fluid which may have been thrown out. Intense cold is also a valuable anæsthetic, and is so employed in painful operations on superficial parts. It also acts as a narcotic, and produces states of system difficult to distinguish from the effects of alcohol. These anæsthetic and narcotic effects of cold will be considered presently.

1062. *Narcotics*.—The action of these remedies belongs so completely to the fourth head (the action of remedies on the nervous system) that nothing need be said in this place except that the effect of narcotics on the circulating system is the opposite of that produced by stimulants and depressants—viz., that of diminishing the frequency of the heart's contractions. These remedies also affect the respirations in a striking manner, diminishing their number in a still greater degree than that of the pulse. This combined decrease of the pulse and respiration serve to distinguish the action of this class of remedies; for those remedies which, like the depressants, produce great debility, increase the number of the respirations, though in certain cases they diminish that of the pulse. This twofold effect of narcotics on the pulse and respiration is deserving of attention.

1063. The remedies which have been examined affect the circulation primarily by the influence they exert upon the nervous centres; and secondarily, through the reflection of that influence upon the heart. It remains to speak of the means which we have of effecting changes in the smaller arteries and capillary vessels.

1064. *Remedies which affect the small vessels*: Treatment of inflammation.—It has been already stated that in inflammation there is diminished action (that is, diminished contractility) of the small arteries, with increased action of the heart, and that the two together keep up that dilated condition of the small vessels which is the essence of inflammation. It is obvious that there are two ways in which these minute vessels may be restored to their healthy degree of contraction: the first is by lessening the quantity of blood which passes through them; and the second, by increasing their contractility. In most acute inflammations, both these remedies are required. If the inflammation be recent, the small vessels may recover themselves if once relieved from the undue quantity of blood sent to them by the heart; and in this case the abstraction of blood, or the use of depressing remedies, will suffice; but if the inflammation be chronic, the small vessels may have so lost their contractility, as not to recover themselves, though the blood circulates through them in diminished quantity; and in this case we must use such remedies as restore the lost contractility of the vessels; and precisely the same treatment is required in that state to which we give the name of congestion.

1065. The treatment of inflammation then is twofold—it consists

in diminishing the quantity of blood sent out by the heart on the one hand, and in restoring the lost contractility of the small vessels on the other. The first indication can be fulfilled only by general remedies, the second by general or by local means.

1066. As the increased action of the heart occurs only in the *acute* form of inflammation, it is in that form alone that general remedies are necessary. These remedies are blood-letting, aided, in certain cases, by active purgatives; and depressants, of which the best is tartar-emetic. Take, for example, an acute case of pleurisy, occurring in a robust man, or in one previously enjoying good health, the treatment is very simple—bleeding to the approach of fainting, or the complete cessation of pain, followed, without loss of time, by tartar-emetic, in such doses and at such intervals as to keep up a constant state of nausea. Bleeding alone, even though often repeated, will not suffice to subdue the inflammation, for each bleeding is followed by reaction, and that reaction re-establishes the inflammation. By combining depletion with depressing remedies we save blood, and avert chronic disease. If tartar-emetic should fail to subdue the inflammation after one bleeding, which it may possibly do in very plethoric persons, another bleeding must be resorted to, for it is always better to risk temporary debility than chronic disease.

1067. The great principle to be observed in the treatment of acute inflammation, is to subdue it at once, so as not to allow reaction; and to give the small vessels time to contract to their usual size.

1068. In thus advocating a prompt and decisive line of treatment in acute inflammation occurring in healthy persons, it is necessary to guard against the extension of this principle to cases of so-called acute inflammation occurring in the unhealthy inhabitants of large towns, in whom it may be necessary not merely to abstain from depletion, and the use of depressing remedies, but, in spite of the existence of inflammation, to adopt even an opposite mode of treatment.

There is also one disease of common occurrence, and of very fatal tendency, to which, for obvious reasons, the active treatment of inflammation is in most cases inapplicable. That disease is pneumonia, which is, in part, an inflammation affecting the vessels supplying the texture of the lung, and in part a congestion of the vessels conveying the blood to and from the lung for other purposes. Though active measures would tend to reduce inflammation in the tissues of the lung, they would, at the same time, by reducing the force of the heart's beat, tend rather to increase than to diminish the congestion of the pulmonary vessels. It is in this disease, therefore, that a purely expectant treatment, or, in the case of the inhabitants of large cities, a stimulant treatment, has been shown to produce the best results.

1069. Such is the treatment of acute inflammation when it is accompanied by strong action of the heart. But this is not present in all cases of inflammation. It is absent in inflammation of the

mucous membranes, unless they take on the most acute character, as in croup, or in cases of irritant poisoning; it is absent also in erysipelas, and in many cases of inflammation occurring in persons of broken constitution. The chief inflammatory diseases which affect the general circulation are those of the serous membranes, acute rheumatism, and extensive inflammation of the cellular membrane following injury.

1070. When inflammation of the mucous membranes occurs in its most severe form, depletion is necessary, especially if the affected membrane line some narrow passage, which is apt to be filled with the secretion poured out from its surface. Thus we bleed in croup, partly on account of the existing inflammation, and partly because the narrow passages of the larynx and trachea are apt to be filled up by the tenacious secretion poured out from the surface of the membrane.

1071. There is another case in which we are obliged to employ general remedies, though the existing inflammation does not materially affect the circulation or threaten life—viz., when the part affected by the inflammation is an organ of such extreme delicacy that the continuance of inflammation in it would destroy its functions. This is the case in inflammation of the internal parts of the eye, when the most active measures are necessary to save the organ from destruction.

1072. As a general rule, then, it may be stated, that blood-letting is required in robust and plethoric persons, and when inflammation is accompanied with increased action of the heart, or when some function essential to life is impeded, or some delicate organ threatened with destruction. In most other cases, general bleeding will be unnecessary.

1073. The second indication—that of causing the small vessels to contract on their contents—may be accomplished in various ways: *locally*, by pressure, cold, astringent applications, and the cautious use of substances which themselves cause inflammation, but act as gentle stimulants when applied in small quantity, and for a short period; and *generally*, by remedies which experience has shown to possess that property.

1074. If the vessels are much distended with blood, local depletion is indicated as a preparatory measure. When the small vessels have been by this means partially emptied of their contents, we may apply the remedies just mentioned according to the nature of the inflamed part. Pressure, properly applied, lends support to the vessels, and gives them time to contract; cold acts on all the textures of the part, on the vessels as well as on the nerves which supply them; astringent applications cause all the textures to contract, at the same time that they gently irritate the vessels, and excite them to the performance of their proper function; while the direct irritants, as nitrate of silver, and the sulphates of zinc and copper, prove beneficial simply by their stimulating property.

1075. All these applications have been used with advantage—pres-

sure, in chronic inflammation and ulceration of the extremities, and in swelled testicle; cold, in every form of external and internal inflammation, as in common phlegmonous inflammation of the skin, in the inflammatory sore throat of scarlatina maligna, in the inflammation of the fauces attending hydrophobia, in inflammatory diseases of the rectum and vagina; astringents, in common or specific inflammation of the mucous membranes; stimulants, in phlegmonous inflammation of the skin, to the surface of irritable ulcers, and to the mucous membranes in the form of injection.

1076. The general remedies which promote the contraction of the capillaries (that is to say, remedies which act through the system and not by local application), are the metals, especially tartar-emetic, mercury, and arsenic, which, like iodine, act on the capillaries of every part of the body; also in a less degree, the fixed alkalies, and their salts; and certain remedies which affect particular organs, as uva ursi, copaiba, cubebs, pepper, cantharides, and turpentine.

1077. The first class of remedies (tartar-emetic, mercury, arsenic, and iodine), when applied to the skin, excite inflammation; this shows the power which they exercise over the capillaries: they are also capable of being absorbed into the circulation, so as to be applied to the capillaries in the most direct manner. Hence, when administered internally, they may be presumed to have the same power of curing inflammation which nitrate of silver has when locally applied.

1078. The cases in which one of these remedies is more applicable than another are found out empirically. Tartar-emetic is to be preferred in common inflammation, mercury and iodine in specific inflammation. Mercury has the preference over all other remedies in cases of great urgency (such as iritis and croup), when no time is to be lost, and our object is not merely to subdue the existing inflammation, but to suspend specific disease, of which it is a part.

1079. Uva ursi, copaiba, cubebs, and black pepper, are all employed with great advantage in inflammation of the mucous membrane of the urinary passages. They act as direct stimulants through the urine, and when given in sufficient doses, cure gonorrhœa, even in its acute stage. Uva ursi is used chiefly in inflammation of the mucous membrane of the bladder; copaiba and cubebs in gonorrhœa, in which disease pepper has been employed by Dr. Billing with equal advantage, and black pepper in hæmorrhoids. Copaiba has also been prescribed with advantage in cases of bronchitis.

1080. *Hæmorrhage* differs little from inflammation in the treatment it requires. Active hæmorrhage demands the same remedies as acute inflammation, and passive hæmorrhage may be cured by the same means which are found useful in some forms of chronic inflammation—viz., astringent remedies, such as cold, the preparations of lead, and the medicines which contain tannin as their active principle.

1081. The treatment of *febrile affections* is governed by the same general principles that preside over the treatment of inflammation. When they are free from the complication of local disease, and are attended by a frequent, full, and hard pulse, depressing remedies, such as bleeding and tartar-emetic, separate or combined, are indicated: but in cases attended by great prostration of strength, with a small and frequent pulse, tonics or stimulants, according to the degree of the existing debility, are required. Local disease must be treated by general or local remedies, according to the powers of the system, with the general precaution that the strength of the patient must be husbanded as much as possible, in order that he may not be worn out before the disease has run its appointed course. The same remark applies with equal force to those febrile affections of which local inflammations form a constituent part, as the febrile exanthemata, measles, scarlatina, small-pox, and erysipelas.

1082. The process of *secretion* is one over which medicine exerts much power either directly or indirectly. The most important secretions are those of the lungs, skin, and kidneys. The ærial secretions of the lungs not being subjects of observation or measurement at the bedside, yield in point of importance to the two latter.

1083. The nature of the process of secretion, and of the influence which remedies have upon it, will be best understood by selecting the secretion of the skin as an example. When the skin is red, hot, and dry, we can excite perspiration by the cautious application of cold; when it is pale, cold, and dry, by the application of heat. In the one case we diminish the size of the capillaries, and consequently the quantity of blood which they contain; in the other, we increase both. In the same conditions of skin, and in the same states of system, we can produce the same results by depressants, on the one hand, and by stimulants on the other. It appears, then, that in the case of this important secretion, we can produce the same effect by a local application and by an internal remedy. In both cases, the temperature of the skin favourable to sweating is intermediate between the two opposite conditions, accompanied by the dry skin. This intermediate state of the skin may be termed the "sweating point."

1084. It is true that this point is not fixed, for it must vary in different persons, not only with the temperature of the skin and the quantity of blood circulating through the capillaries, but with the condition of the capillaries themselves; so that in strong and robust persons it must be, so to speak, much higher than in those worn out by disease; while in extreme debility it is well known that cold sweats take place from mere relaxation of the capillary vessels, when the temperature of the body is extremely low.

1085. It appears, then, that increased secretion from the skin may be brought about by remedies which act upon the general circulation, and this fact may be extended by analogy to other secretions also. Thus, blood-letting, practised in a case of inflammatory fever, will

promote the flow of all the secretions, by relieving the congested condition of the capillaries, and thus bringing the glands to what may be termed their secreting point.

1086. In this place it is necessary to enter a protest against the anxiety often entertained by the practitioner to obtain diaphoresis. Sweating is, no doubt, a good sign, and a useful thing whenever the skin is hot and dry; but as in the administration of so-called diaphoretics, the sweating is the necessary consequence of the change which has been effected in the general circulation, our anxiety should be, not to procure diaphoresis, but to bring the circulation into that state in which sweating is possible. Thus, when the skin is hot and dry, we select a depressant, when cold, a stimulant diaphoretic. On the same principle, we select a stimulating diuretic in languid states of circulation, and a depressing one when there is strong febrile action.

1087. It is not meant to assert that all remedies which promote secretion act only through their influence on the general circulation; for the strong analogy which may be drawn from the local action of remedies on the capillaries in inflammation must admit of application to other states of those vessels; and as it is probable that secretion does not depend upon the mere size of the vessels and the quantity of blood circulating through them, but also on the condition of their coats, there is good ground for believing that some remedies act directly upon the capillaries themselves. The virtue of tartar-emetic may, perhaps, depend on this local action, as well as on its effect upon the general circulation. In the majority of cases the latter explanation appears sufficient.

1088. There is, indeed, one case in which the action of remedies in promoting secretion appears to depend almost exclusively upon the adaptation of the remedy to the quality of the secretion itself. The urine, for instance, abounds in salts, and it is well known that saline medicines are of great efficacy in promoting that secretion: the perspiration, too, contains salts, though in less quantity, and may, therefore, like the urine, be increased by the use of remedies of which salines form a part. Thus, Dover's powder may possibly derive part of its efficacy from the sulphate of potash which it contains.

1089. Admitting, then, that the secretions may be promoted both by general remedies and by remedies acting locally on the capillaries of the secreting organ, it is important to distinguish the two cases, and to bear in mind that in disease affecting the general system, it is not so much our object to promote the flow of the secretions as to bring about that state of the circulation in which secretion takes place as a necessary consequence.

1090. The remedies adapted to promote the *absorption* of fluids thrown out into the several cavities of the body, act for the most part through the general system. Of these the most powerful remedy is blood-letting, which acts by diminishing the quantity of the circulating

fluid, and when the cause of dropsy is of an inflammatory nature, by removing the inflammation. The other remedies in common use are employed with the same views. They consist of medicines directed to the several secreting organs, especially the bowels, kidney, and skin. The increased secretion from these parts has the twofold effect of blood-letting—that of diminishing the quantity of the circulating fluid and of subduing any inflammation which may exist.

1091. Where much general debility is present, it may be necessary to combine tonics or stimulants (for stimulants are tonics to the debilitated) with depletion. To proportion the one to the other, much judgment and care are necessary.

1092. The local means best adapted to promote absorption, are those which stimulate the capillaries and parts affected, such as friction with the hand, or with stimulating liniments, tincture of iodine, a jet of cold water, or electricity. It is of little consequence to inquire whether these agents act by restoring the capillaries to their healthy state, or by stimulating the absorbents. (See § 365.)

4. REMEDIES ADAPTED TO THE REMOVAL OF THE SOLID STRUCTURES OF THE BODY.

1093. Morbid growths have been divided (see § 406) into analogous and heterologous. Experience shows that we have little or no power over the latter class; they form one of the *opprobria* of medicine, and where they cannot be removed by the knife, we can do nothing more than alleviate the sufferings they occasion. The same observation extends to such analogous formations as do not consist in a mere hypertrophy of a natural texture.

1094. Atrophy and hypertrophy, indeed, seem to be the only alterations of the solid structures of the body which are under the control of medicine. The remedies applicable to the restoration of a part from the condition of atrophy are, exercise, friction, electricity, and, in short, all those means which increase the flow of blood to the part and promote its natural actions. The remedies, on the other hand, which are of use in hypertrophy are, rest, pressure, cold, local abstraction of blood, and preparations of mercury and iodine.

1095. The rationale of the action of the first-named remedies is obvious, but there is some difficulty in explaining the efficacy of mercury and iodine in promoting the absorption of solid textures. Are the capillaries contracted by these medicines so as to diminish the quantity of blood passing through them to a degree which is incompatible with secretion?—or are the absorbents stimulated to increased activity? The former supposition appears the more probable, and is more in conformity with what we know of the functions of the capillary vessels. The question, however, is of no immediate practical importance.

5. REMEDIES WHICH ACT UPON THE NERVOUS SYSTEM.

1096. As all the functions of the body are more or less dependent on nervous influence, it follows that all remedies possessed of active properties must affect the nervous system. All the medicines, therefore, which have already been mentioned under preceding sections, belong with equal right to this. Stimulants, depressants, sedatives, narcotics, and some medicines, at least, which belong to the class of tonics, affect the circulation through the nerves; and even those remedies of which the action is strictly local act locally on the nerves, and, through them, on the vessels to which they are distributed. But there are some substances which exert so peculiar an influence on the nervous system as to demand a separate notice in this place.

In the action of medicines on the nervous system, we recognise three marked varieties. Some exalt the nervous energy, and produce a state of general excitement in all the functions of the nervous system; others soothe the nerves, tranquillise the mind, and procure sleep; while a third class displays its power chiefly on the nerves supplying the important organs of circulation and respiration, while they derange the functions of the brain, and occasion delirium. The first class are known as *stimulants*, the second as *narcotics*, the third as *sedatives*.

1097. (1.) *Stimulants*.—The mode in which these remedies affect the body, and the cases in which they may be used with advantage as medicines, have already been pointed out when speaking of the action of medicines on the organs of circulation (§ 1040). It is only necessary to add, in this place, that these remedies not only affect the circulation in the manner already described, but also all the functions of the brain, spinal cord, and nerves. The most active and efficient stimulants are ammonia and its carbonates, phosphorus, musk, mustard, and turpentine; to which may be added the more active and diffusible substances contained in the class of narcotic medicines, namely, alcohol, æther and chloroform, and camphor, the first effect of which is to stimulate the system. To these may be added, as special stimulants affecting the spinal cord and nerves of voluntary motion, the alkaloids strychnia and brucia, and the plants which contain them.

1098. (2.) *Narcotics*.—The *narcotics*, of which opium, and its alkaloid, morphia, are the chief, and lactucarium, the hop, and the nutmeg, the less important, are employed to relieve pain, when they are called *anodynes*; or to soothe irritation, when they are termed *paregorics*; or to diminish inordinate muscular contraction, in which case they are called *antispasmodics*; or, lastly, to procure sleep, when they receive the name of *hypnotics*, or *soporifics*. Opium is both stimulant and narcotic; hence it is admirably adapted to the state of irritation accompanied by much debility, the narcotic soothing the excitement, while the stimulant principle counteracts the existing debility. Sulphuretted hydrogen, carbonic acid, carbonic oxide, and cyanogen gas,

act also as narcotics. As such carbonic acid gas has been locally applied.

1099. The remedies which occasion sleep or stupor as their principal symptom, or as one of their leading symptoms, are sometimes grouped under the one head of narcotics, which is then subdivided into the smaller groups of *inebriants*, *soporifics*, and *deliriant*s. The first group (*inebriants*) comprises alcohol and alcoholic liquors, chloroform and the æthers, camphor, and the Indian hemp, to which may be added tobacco and lobelia inflata. All these remedies produce the phenomena of intoxication; but while the first-named act first as stimulants, the last two, tobacco and lobelia, have the opposite effect of depressants. The second group (*soporifics*) contains only one medicine of importance, opium; lettuce, hops, and nutmeg being of inferior value, and therefore rarely used. The third group (*deliriant*s) comprises hyoscyamus, belladonna, and stramonium. These substances, it is scarcely necessary to observe, are not given in the practice of medicine in such doses as to occasion delirium. If classed according to their use as medicines, they rank with sedatives. Of these three groups the first and second are the most important: the first as containing the invaluable *anæsthetic* chloroform; the second, the no less valuable drug, opium.

1100. (3.) *Sedatives*.—The class of *sedatives* comprises many substances allied in some of their properties to the narcotics, and in others to the depressants. They differ from the narcotics in not producing sleep, but, on the contrary, delirium, in some of its many forms. Thus, hyoscyamus, belladonna, stramonium, monkshood, black hellebore, veratrum, colchicum, and camphor, to which perhaps musk and valerian may be added, give rise to delirium in the first instance, which is sometimes followed, after a considerable interval, by coma. Tobacco, ipecacuanha, conium, squills, and digitalis, appear to produce coma without previous delirium. Tobacco, ipecacuanha, and squills, and the lobelia inflata, have been already described as depressants, and have been shown to have a remarkable effect on the muscular system. Tea and coffee belong to the class of sedatives. But the class contains no more important member than cold.

1101. Cold has already been mentioned more than once, when speaking of the effect of medicines on the circulation, as a remedy of great power (§ 1061). But cold produces a marked sedative effect on the nervous system, without any corresponding effect on the circulating organs. It blunts sensibility, and therefore subdues pain. Applied suddenly, it is an effective shock, and rouses both the body and mind. Hence the efficacy of cold water dashed in the face in hysteria, where all that is necessary to remove a paroxysm is strongly to excite attention and an effort of self-control: hence, also, its use in syncope and asphyxia. In the disorder of the nervous system which follows severe inflammatory diseases of the brain, it forms a most effective stimulus, rousing the nervous system, and gradually restoring all the functions of the organ. In cases of violent nervous excitement, on the other hand, it

acts as a powerful sedative, allaying the irritation of the nervous system, and reducing the frequency of the pulse, subduing the most violent pain, and infallibly procuring sleep. Such are its effects in the most violent paroxysms of mania.

Having thus briefly indicated the chief remedies which affect the nervous system, it will be useful to speak more particularly of the action of remedies on the special functions of the nervous system, sensation and voluntary motion.

1102. The remedies which act upon the *nerves of sensation* are classed by the toxicologist with narcotic or narcotico-acrid substances; but in works on *Materia Medica* they are considered as sedatives. Of these aconite is the most powerful. It produces numbness, accompanied by a tingling sensation in the parts to which it is applied. Strong hydrocyanic acid, locally applied, also produces numbness; opium and belladonna, too, act locally on the nerves of sensation; and chloroform acts powerfully as a local anæsthetic, after producing, as its first effect, redness and heat of surface. But the best and most powerful local sedative is cold. It is more sure and manageable than any other, and, with proper precautions, may be applied whenever a sedative is indicated.

1103. Belladonna, and other active principles from the class of narcotico-acrid poisons, also possess a power of causing dilatation of the pupil through their operation on the retina, whether they are given internally or applied directly to or near the eye.

1104. The *nerves of voluntary motion*, and through them the muscular system, are powerfully affected by remedies in three different ways—with paralysis, convulsions, and tonic spasms.

1105. Extreme debility of the muscles is the familiar effect of all depressing remedies, and especially of tobacco. The same effect is produced by tartar-emetic among mineral poisons, and by tobacco and lobelia inflata among vegetable poisons. Paralysis is produced by various poisons, as the woorara, ticunas, and curare, by large doses of aconite, conium, and stramonium, and by one metallic poison—lead.

1106. Convulsions are produced by almost all the narcotico-acrid and irritant poisons: they precede the fatal event in quick poisoning by hydrocyanic acid. They occasionally occur in the course of poisoning with opium; and they are present in poisoning with arsenic and the more active mineral poisons.

1107. Tetanic spasms are produced by nux vomica, by St. Ignatius' bean, by the upas tieuté, and by the active principles strychnia and brucia. They are an occasional effect of monkshood, and of the ergot of rye taken in poisonous doses. They are also sometimes present in cases of poisoning by the more active irritants.

1108. The muscular contractions of the uterus caused by the secale

cornutum furnish an example of local action on the museular fibres, of which advantage is taken in the practice of midwifery.

1109. The treatment of diseases dependent upon, or accompanied by, local affections, with reflex action of the muscles, is of much importance, and in this respect the theory of the excito-motory system is likely to confer great practical benefits on medical treatment. The importance of attending to the local affections in tetanus and hydrophobia, for instance, can scarcely be overrated. In the latter disease, ice has been swallowed with great relief to the symptoms.

1110. Many of the metallic substances used in medicine appear to exert a peculiar influence on the nervous system. They are remedies which act locally as irritants, and when administered in small doses, and during a considerable period, as tonics: as such, they have been used with advantage in chorea and epilepsy. Arsenic, copper, iron, silver, and zinc, belong to this class.

6. CLASSIFICATION OF REMEDIES.

1111. From the foregoing considerations it appears that medicines admit of classification according to their physiological action. Such a classification as the following may be adopted:—CLASS I. STIMULANTS.—(a) *general*, (b) *local*. CLASS II. TONICS.—(a) *general*, (b) *local*. CLASS III. DEPRESSANTS. CLASS IV. SEDATIVES. (a) *general*, (b) *local*. CLASS V. NARCOTICS.

For a full classified list of medicines, the reader is referred to the end of the volume.

7. NURSING.

1112. In nursing a patient attention must be given to the following particulars:—Situation of the sick-room; the room itself—its arrangements, temperature, ventilation, amount of light, refreshment; administration of medicine and food; personal comfort of the patient; general condition of the patient; intercourse between the patient and his attendants; precautions to be used in cases of contagious disease.

1113. *Situation of the sick room*.—When we can exercise a choice, a south, south-west, or west aspect should be preferred. In acute inflammation of the brain or eye a north aspect is best.

The room should be spacious, lofty, lightsome, and furnished with a chimney possessing a good draught. In most cases the carpet should be retained, but all superfluous furniture, hangings, and articles of clothing removed.

1114. *The patient's bed* should be so placed that its head is out of the direct currents of air from the door and windows, and that ready access may be had to either side of it. It should be furnished with rollers that it may be wheeled to any part of the room. As a rule bed curtains should be entirely removed. A calico screen may be used to

intercept draughts, or a view of the door, or of that portion of the room used by the nurse in the preparation of food or medicine.

1115. *Temperature* may range from 60° to 70° Fahr., according to the feelings of the patient. If the patient complain of cold, a hot water bottle, or cushion, or an additional blanket may be used; but the temperature of the air should be kept as constant as possible.

1116. *Ventilation*.—In cold and moderately warm weather a fire should be kept constantly burning. If the external air be very cold, the fresh air may be derived through the door from the lower parts of the house. If temperate, the landing window and the bedroom door or one of the bedroom windows should be opened. In summer time when it is too warm to have a fire, the windows should be fully down during the day and at night more partially opened. The door may be kept ajar and occasionally fanned to and fro to cause a freer circulation of the air. Vitiation of the atmosphere of the sick-room by many visitors and too many attendants must be avoided. The combustion of gas, too, must be prohibited. Growing plants may be freely introduced into the sick-room, as they serve both to purify and to moisten its atmosphere.

1117. *Light* should be moderated according to the feelings of the patient. If he be at all watchful, it should occasionally be excluded during the day, advantage being taken of the times when the vigilance is least. It must be constantly excluded in cases where there is active inflammation of the brain or eye. Direct sunlight is rarely tolerated or desirable in acute disease, but its effect in some chronic diseases is both pleasing and refreshing. Where the vital functions are low, some good may be expected from prolonged exposure of the naked body to direct sunlight.

1118. *Refreshment*.—Fæcal odour should be counteracted by burning a little incense, or a pastille, or sprinkling a little eau de Cologne about. If the exhalations or evacuations of the patient be offensive, as in contagious fevers, diphtheria, gangrene of the lung, &c., the carpet being removed, the floor should be sprinkled several times a day with clear solution of chloride of lime, or rags wetted with Condy's fluid (solution of permanganate of potash) and suspended near the bed. In cases of infectious disease, baskets of wood charcoal should be placed under the bed and in the corners of the room, and the evacuations should be mixed with chloride of lime or zinc before removal.

1119. *Administration of medicine*.—If the medicine be at all pungent, it should be given well-diluted with water, or else it may cause coughing and nausea. The doses should be carefully measured in a medicine-glass and given (since many are very volatile or insoluble) without delay to the patient. As a rule medicine should be given an hour before food. But if there be need to administer nutriment frequently, the medicine must be given so as least to interfere with it: stimulants may be taken with stimulants, and tonics with food; purgatives should be given before food; hypnotics at any time.

1120. *Administration of food.*—If the patient be at all inclined to disgust at the sight of food, only very small quantities should be offered at a time, and we may thus induce him to partake of it again and again when a larger quantity presented at once would have excited distaste. In irritable conditions of the stomach a tablespoonful of nourishment may produce vomiting, and we must give only a teaspoonful and repeat it the oftener. Strong tea and jelly may be both very suitable and harmless, but together, we must remember, they form indigestible leather. Orange juice is generally harmless, but few things are more indigestible than the pulp. In the typhous condition food or stimulants are needed every hour; and as the patient is well-nigh insensible to his wants, his life depends on the close attention of the nurse.

1121. *The nurse* should be quiet, circumspect, and firm. She should possess the tact which can only be acquired by experience. Good eyesight is an indispensable qualification. She should set aside out of easy reach sedative draughts, liniments, &c., and only the ordinary mixture should be readily accessible. She should be aware of the ready inflammability of turpentine, and be provided with oiled silk, oiled cloth, &c., so as to prevent discomfort to the patient in the use of poultices. She should be allowed as little discretion as possible; written directions as to the nature and quantity of food and medicine and the times of its administration should be given to her, and she should be directed to make a written report accordingly, and to note down the number of hours during which the patient has slept, the time at which any new symptom, such as pain, dyspnoea, vomiting, or fits, &c., occurred; whether the bowels or the bladder have acted, and when. She should be directed in certain cases—such as constipation, diarrhoea, enteric fever, dysentery, hepatic disease—to set aside the evacuations in the water-closet. A bed-pan and a glass urinal should be provided in severe disease, for the patient's use. The urine should be occasionally preserved for examination.

She should look to the general condition of the patient, such as the temperature of the body, and especially of the feet. In the typhous condition these parts are often accidentally discovered cold and purple, and when it is often too late to recover them from this incipient stage of gangrene. In spinal and cerebral diseases, as well as in the typhous condition, the integument over the sacrum and trochanters must be daily looked to; and if it appear congested, lead plasters spread upon amadou or wash-leather must be applied, and the pressure obviated by a water-pillow or water-bed. The medical attendant must occasionally verify the statements of the nurse, and himself examine the condition of the hypogastric region. Care must be taken in cold weather, on placing a patient on a water-bed, that a thick non-conducting layer of folded blankets intervene between the bed and body of the patient. If cold be complained of, we must occasionally introduce hot water and draw off the cold.

1122. *Personal comfort of the patient.*—If the patient's condition allow of it, his bed should be made every day, and a couch should be

near upon which he may be placed. In cases of protracted illness it is desirable that the room contain two beds in order that he may be transferred each day from one to the other. Except in contagious diseases, the linen should be often changed, and at such a time a bath may be given, or the surface sponged with warm water. No sick room should be without a bath, for we have no more efficient means of provoking sweat and of soothing nervous excitability. In some cases (scarlatina, suppression of urine, convulsions) its use is indispensable. A thermometer should be appended. For a tepid bath we may prescribe a temperature of 85° ; for a warm 95° ; for a hot 105° .

If it can be done without producing fatigue, the teeth should be brushed and the mouth cleansed occasionally.

1123. *Thirst* may be allayed by toast-water, thin gruel, or barley-water, by soda-water, lemonade, or iced water slightly acidulated, if need be, with sulphuric or phosphoric acids, and sweetened. In the typhous condition spirit or wine must be added to such of these drinks as we think proper to order.

1124. *General management of the sick-room.*—All should be quiet and yet cheerful here. If the patient be at all unduly apprehensive of his condition, anxious looks and tones must be avoided in his presence, and the behaviour of the attendants should be the reverse of that which may engender doubt and anxiety in his mind. When he is awake to impressions, there should be no whisperings in his presence or hearing. In the sick-room all our communications should be *with* the patient, either directly or openly through the nurse. We must inspire confidence and hope by a plain, easy, and decided manner. There must be no mystery or ambiguity about our acts and words. We must answer the solicitous inquiries of the patient as simply and straightforwardly as possible, so as to leave no doubt in his mind. "You are better by this little indication." "You are worse because of this complication, against which I am going to direct remedies such as we may reasonably hope will cause it to yield sooner or later." "What you want is sleep, and this we will secure for you to-night." Such must be the language of the medical attendant.

1125. The sensations and ideas are so perverted in delirium that patients labouring under mental disease, whether primary, or secondary to some other affection, are perhaps best treated by assuming a cheerful indifference towards them. Homicidal and suicidal tendencies should be carefully regarded; all instruments with which injuries may be inflicted removed, and windows secured. If the patient obstinately refuse food, do not press it—put it from time to time before him, and let others eat in his presence. Loud, strange, or uncertain noises should be prevented. The influence of gentle music should be remembered and its effect tried.

1126. In cases of protracted illness in which the intellect remains clear, we may give the patient the benefit of change of scene by varying the position of the bed, and changing from time to time the pictures

in the room. The verdure of foliage, the colours of flowers, and the silent movements of animals are always objects of pleasure to the sick. It would be well, therefore, to distribute about the room, Wardian cases, aquaria, and flowers of various hue. Anxiety and gloom are the inseparable companions of severe illness, and we should not neglect any means, however trifling, of dispelling them.

1127. When a case of contagious fever occurs in a house, and the patient cannot be removed, the strictest precautions are necessary to prevent the spread of the disease. The younger members of the family should be sent away at once, or if this be impracticable, they should live and sleep on the ground-floor. The patient should be placed in the airiest and most secluded room in the highest part of the house, and no persons but those in attendance should be allowed to visit the floor occupied by him. If possible he should be under the care of a single nurse, and an adjoining room should be devoted to her use. She should go down stairs as seldom as possible, long communications should not be held with her, and before leaving her room she should be careful to wash her hands. A fire and a large kettle of boiling water should be constantly kept in her room. A separate set of articles should be devoted to the patient's and the nurse's use, and before they are sent down stairs, they should be placed in a vessel, and boiling water poured directly from the kettle upon them. Linen should be treated in the same way, and then wrung out and put aside. It should be allowed to accumulate to the end of the illness, and then, after exposure a second time to the action of boiling water, it may be sent altogether to the laundress. The nurse should have ready means of communication with the people below; her food and that of the patient should be brought up to the landing on the floor below, where she should receive it. The patient's room must of course be as thoroughly ventilated as possible. Disinfectants should invariably be mixed with the dejections, and during their transit to the water-closet the vessel containing them should be tightly covered. The water-closet pan should be well flushed, and if other conveniences be near, the rest of the inhabitants should avoid this part of the house.

1128. After convalescence the patient's room must be thoroughly cleansed. Infected clothes which cannot be washed must be burned. The bed, mattress, and carpets which may not have been removed must be baked in a hot oven; oil paint scoured, the ceiling whitewashed, the walls re-papered, the floor scalded, and afterwards scrubbed; the door should be kept closed, and all the windows opened, and a large fire should be kept up during, and for some days after, the cleansing. Boiling water, whenever it can be applied, is a thorough disinfectant. We may use the ordinary disinfectants, such as charcoal, chloride of lime, chloride of zinc (Burnett's fluid), permanganate of potash (Condy's fluid), in addition, but we must on no account trust to these alone.

PART II.

PRACTICE OF MEDICINE.*

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* In the earlier editions of this work, Cullen's Nosology was followed; in subsequent ones the Editor has adopted that order of arrangement which seems most likely to be useful in a practical work. It is not founded upon hypothetical principles, but is intended to bring together those subjects which have the most obvious connection with each other.

GENERAL DISEASES.

CHAPTER I.

STATES OF THE SYSTEM.

PLETHORA	The Plethoric State.
ANÆMIA	The Anæmic State.
CACHEXIA	The Cachectic State.
MIMOSIS INQUIETA	The Nervous State.
FEBRICULA	The Febrile State.

THE subjects treated in this chapter have peculiarities which entitle them to a place by themselves. They are rather disordered states of system than diseases properly so called. They consist in a departure from health, more or less permanent, not necessarily complicated with any local affection, and often present and cognisable in combination with specific and well-defined maladies. A plethoric, an anæmic, or a cachectic patient, or one suffering from extreme debility, or from a group of nervous symptoms, may become the subject of one and the same disease, such as typhus fever or small-pox, which disease will be materially influenced in its character, progress, and termination by that pre-existent *state of system*. The treatment also which it may be proper to adopt, with a view to the cure or relief of the patient, will be materially influenced, and in some cases altogether determined, by the state of system on which his disease has supervened. Again, in all those diseases in which the symptoms are obscure, or the appropriate remedy not yet discovered, the only course open to the physician is to direct his prescriptions to the state of system. Nor are these states of system unimportant in themselves; for not only are some of the symptoms which characterise them very painful and distressing, but they are apt to be confounded with the symptoms of diseases requiring very different, and, generally speaking, much more active treatment. Nor ought it to be forgotten that these states of system may be themselves brought on by several analogous local or general causes, and that to recognise the state of system is to possess a clue to the often obscure, and little suspected, origin of the existing disorder. This observation applies with peculiar force to the three states of

anæmia, cachexia, and mimosis inquieta. For these reasons the contents of this chapter are placed by themselves, and take precedence of diseases so called.

PLETHORA.—THE PLETHORIC STATE.

SYNONYMS.—General Hyperæmia.—Polyæmia.—Fulness of blood.
—A full habit of body.

DEFINITION.—A state of system characterised by an excessive quantity of blood, or by an excess of its more solid constituents.

VARIETIES.—Plethora may exist in various degrees of intensity, from that slight degree known as a full habit of body, up to that more intense form in which the circulation is oppressed, and the functions directly connected with it seriously deranged.

SYMPTOMS.—The general aspect of the body full and florid; the capillaries of the surface injected; the redness of the skin momentarily removed by pressure; the lips red; the eyes bright, and the conjunctiva injected; the tongue clean and red, or slightly furred; the appetite generally good; the bowels usually confined; the skin dry, but perspiring profusely on exertion; the pulse frequent, full, firm, and bounding. In the more strongly-marked cases, the pulse is infrequent, indistinct, and labouring, or irregular in force and frequency, according to the degree in which the heart is oppressed; the extremities are cold; the patient is weak, listless, and easily fatigued, and suffers from palpitation and shortness of breath, and frequent sighing on exertion; and complains of giddiness, noises in the ears, light or dark spots before the eyes, and a dull heavy pain in the head.

COMPLICATIONS.—Hysteria. The symptoms of Mimosis inquieta (p. 292), at or about the change of life. Hæmorrhoids in both sexes.

TERMINATIONS.—In local congestions, inflammations, and hæmorrhages; in apoplexy, especially in persons with large chests and short necks; in hypertrophy of the heart; in gout.

PATHOLOGY.—This disorder consists in an excessive quantity of blood, or, the quantity remaining unchanged, in a superabundance of red particles and fibrine.

CAUSES.—*Predisposing*: A peculiar habit of body, with large chest and short neck. *Exciting*: A highly nutritious diet; beer and spirituous liquors; sedentary habits; too much sleep; inadequate exercise, with free exposure to the air; suppression of catamenia.

DIAGNOSIS.—This state is easily recognised by the fulness of the whole capillary system, and the rapid filling of the vessels of the surface on the removal of pressure.

PROGNOSIS.—Favourable ; but this state of system, though admitting of improvement, can rarely be altogether removed.

TREATMENT.—*Indication* : To increase the actions of the emunctory organs, and to lessen the quantity of blood.

In the common run of cases, this indication is best fulfilled by a spare diet, abstinence from malt and spirituous liquors, early rising, regular exercise, and the frequent use of saline aperients. (℞ Magnesiae sulphatis, ℥i., magnesiae carbonatis, ℥i., aquae menthae piperitae, aquae aa f. ℥iv. M.) Two or three tablespoonfuls of this mixture may be taken three times a day ; or the compound colocynth pill may be given every night, followed by a wine-glassful of the mixture every morning.

In extreme cases, and where there is a threatening of local disease, bleeding from the arm should be practised in addition to the treatment just prescribed. The quantity of blood abstracted must depend on the effect produced and the relief afforded. As a general rule, small bleedings are to be preferred ; but in some cases the system will bear the removal of forty ounces, or more. The blood should be taken from a small orifice, in the semi-erect or recumbent posture, and the pulse should be examined to ascertain the effect produced. When it is frequent, full, and bounding, blood may be drawn till it falls to its natural frequency and force ; if labouring, till it becomes full and free ; if irregular, till it becomes regular. But, as a general rule, it is better to avoid the letting of blood, and to trust to the prolonged use of abstinence, exercise, early rising, and saline aperients.

PROPHYLAXIS.—To prevent the too rapid formation of blood, the diet should be plain and somewhat restricted, and total abstinence from malt or spirituous liquors must be enjoined ; perspiration must be promoted by brisk exercise ; and the bowels must be kept free by suitable aperients.

TREATMENT OF COMPLICATIONS.—In females suffering from amenorrhœa, blood may be taken from the groin by from four to six, or more, leeches applied at the menstrual periods. If there is much acidity at stomach, with flatulence and heartburn, xx or xxx grain doses of bicarbonate of soda, or of bicarbonate of potash, may be given with advantage. If symptoms threatening apoplexy or gout be present, the treatment must be modified in accordance with the pathology of those diseases.

ANÆMIA.—THE ANÆMIC STATE.

DEFINITION.—A state of system characterised by a diminished quantity of blood, or by a diminution in the red particles and other solid ingredients.

VARIETIES.—1. Direct anæmia, resulting from direct loss of blood. 2. Chronic anæmia. 3. Cachectic anæmia, or ehlorosis.

1. DIRECT ANÆMIA RESULTING FROM DIRECT LOSS OF BLOOD.

SYMPTOMS.—The most familiar of the effects of loss of blood (or of profuse discharges rapidly poured out) is *syncope*, of which the symptoms are giddiness, followed by loss of consciousness; suspension of respiration alternating with deep sighs; the pulse and beat of the heart scarcely, if at all, perceptible; the surface pale, and bedewed with cold perspiration. Recovery takes place with momentary delirium, yawning, deep sighs, sickness, and a gradual return of colour to the skin, and of pulse to the heart and wrist. This fainting state is followed by reaction, and recurs from time to time on slight exertion, or change of posture; but in fatal cases the symptoms become gradually and progressively worse; the countenance paler and more sunken; the extremities colder and colder; the breathing panting, gasping, or stertorous; the pulse imperceptible; restlessness and jactitation are followed by coma, or convulsions; at length, the patient's strength is exhausted, and he sinks, gasps, and expires.

The state of *reaction* is characterised by peculiar and strongly-marked symptoms: by forcible beating of the carotids, with a sense of throbbing and tension in the head; palpitation of the heart, throbbing at the pit of the stomach, and in the course of the aorta, and a frequent, bounding, and often irregular sharp pulse; a hurried, panting, sighing respiration; restlessness, jactitation, and mental agitation; intolerance of light and sound; the sleep disturbed by fearful dreams; the waking hurried and perplexed. Violent delirium, mania, coma, amaurosis, and deafness are among the concomitants of this state.

The *sinking state* is characterised by drowsiness, want of recollection, and occasional slight delirium; the breathing is hurried and catching, and interrupted by deep sighs, or by a short cough; the pulse and beat of the heart are fluttering or imperceptible. The pale and sunken countenance, restlessness, jactitation, delirium, cold extremities, loss of power over the sphincters, and loud mucous râle, announce the approach of death, which generally takes place amid convulsions. Sometimes, however, the patient expires during some sudden movement, such as sitting up in bed. Recovery from this state of exhaustion is generally slow and tedious.

POST-MORTEM APPEARANCES.—Effusion of serum on and within the brain; œdema of the lungs; an empty state of the cavities of the heart; increased bronchial secretion; serous effusion into the pleura and peritoneum; general œdema or anasarca; tympanitic distension of the bowels.

DIAGNOSIS.—The extreme pallor of the face, skin, lips, and gums points out the state of the circulation.

TREATMENT.—*Indications.* I. To stimulate the brain with the blood that still remains. II. To maintain the action of the heart by external and internal stimulants. III. To subdue abnormal nervous action. IV. To promote the formation of new blood.

The first indication is fulfilled by placing the head on a level with the chest; the second by the free exhibition of ammonia, wine, or brandy, and the application of cloths wrung out of hot water, or of sinapisms to the region of the heart; the third indication is met by a full dose of opium, such as $\mathfrak{z}\text{i}$. of the tincture, which, in an urgent case, is obviously preferable to the solid preparations of the drug. If violent delirium or acute mania be present, as a consequence of the loss of blood, we may repeat the soporific at intervals of three or four hours, according to the effect produced. Convulsions declare the most imminent danger, and if the means are at hand we should use transfusion of blood from the arm of another person. Galvanism and artificial respiration may be resorted to as a last means of restoration. The formation of new blood will be promoted by the introduction of thin gruel, beef-tea, or an emulsion of egg and milk into the stomach, or, if the power of deglutition fail, into the rectum. Having once fairly re-established the circulation, the subsequent treatment will be that suited to chronic anæmia. For a time the erect or sitting posture must be strictly interdicted.

2. CHRONIC ANÆMIA.

SYNONYM.—Anæmia.

DEFINITION.—A state of system coming on gradually, continuing generally for some weeks or months, and dependent on a decrease in the red particles and solid constituents of the blood.

SYMPTOMS.—Universal pallor of the skin, conjunctiva, gums, and lining membrane of the mouth; dead whiteness of the tongue; cold extremities; debility; fainting fits; palpitation and dyspnoea on the slightest exertion, accompanied by violent pulsation of the carotid arteries; headache, consisting generally in a fixed pain over the eyebrows or on the top of the head; pain under the left breast, or a sense of fullness in the chest; pulse frequent, small, and quick (in extreme cases aptly described as a *jerking* pulse), increased by exertion and emotion. The patient is easily agitated by slight noises or unexpected events, and suffers from depression of spirits, and, in some cases, from hysteric fits; the secretions and excretions are generally scanty, and the bowels often torpid.

PHYSICAL SIGNS.—On applying the stethoscope over the large veins of the neck in the supra-clavicular space, especially on the right side, a humming sound (*bruit de diable*—humming-top sound, or venous murmur) is heard. Slight pressure of the stethoscope upon the larger arteries produces a *bruit de soufflet*, sometimes resembling the soft sound produced by blowing across the mouth of a bottle; at others it is shorter and harsher, and may be likened to the puffing of a locomotive. A soft blowing sound is frequently heard at the base of the heart. In the space above the clavicle the venous murmur and the arterial bellows sound are often heard at the same time. These are doubtless indications

of a flaccid condition of the arterial and venous tubes. They are not peculiar to anæmia, nor are they required as diagnostic marks where the pallor of the surface is well marked.

COMPLICATIONS.—It is often, but not always, associated in the female with amenorrhœa, or with scanty menstruation.

CAUSES.—*Predisposing.* The female sex, and the age of puberty, or the period preceding or following it. It is of rare occurrence in males. *Exciting.* In females obscure, but connected with the function of menstruation. In males occasioned by overwork; as with compositors, bakers, operatives, and others, who work much of their time in darksome, hot, and ill-ventilated rooms. For other exciting causes of the allied state Cachexia, see Cachexia.

PROGNOSIS.—Favourable; but recovery sometimes slow and tedious.

DIAGNOSIS.—From the effects of loss of blood or other drains upon the system, by the history of the case. From chlorosis, by the absence of disorder in the functions of the alimentary canal. The soft basal bellows murmur must not be attributed to *organic* heart disease.

TREATMENT.—*Indication.* 1. To promote the formation of the red particles and solid constituents of the blood. This indication is fulfilled by the use of the preparations of iron in full doses, together with a nourishing diet. The best preparation of iron is the dried sulphate, and the proper dose in well-marked cases of anæmia, five grains three times a day. An excellent combination consists of five grains of dried sulphate of iron, with an equal quantity of extract of gentian. If the bowels be torpid, the pilula aloes et myrrhæ may be given every night, or as often as may be required.

Whenever the skin, gums, and tongue are pale, whatever may be the other symptoms present, steel may be safely given in full doses. I have administered it in five-grain doses three times a day, in a well-marked case of anæmia during the most severe and distressing headache, and with the carotid arteries pulsating violently, not only with safety, but with the most prompt and decided benefit. I know of no remedy upon which such uniform dependence can be placed. I have administered the dried sulphate of iron, combined with extract of gentian, in ten-grain doses; and an anæmic female, who is in the habit of taking these pills as other persons take stimulants, swallowed on one occasion twelve pills, containing half a drachm of sulphate of iron, in one day. The same preparation, in the same liberal doses, may be given with like advantage in the few cases of anæmia which occur in the male subject. (G.)

For other preparations of iron and their doses, see the Prescriptions at the end of the Volume.

A generous diet, with a moderate allowance of wine, is indicated in cases of anæmia accompanied by marked debility; and exercise in the fresh air, proportioned to the strength of the patient, should be insisted on. When the spirits of the patient are depressed, change of air and

scene, and the use of chalybeate waters may be recommended. The shower-bath, and sea-air with sea-bathing may also be prescribed with advantage.

Mercurial preparations should be administered with caution in anæmia, as there is reason to believe that salivation is very readily brought on in this state of the system.

When anæmia is accompanied by amenorrhœa, aloetic aperients are indicated in preference to other medicines of the same class.

3. CACHECTIC ANÆMIA, OR CHLOROSIS.

SYNONYM.—Green sickness.

DEFINITION.—A state of system partaking of the characters of anæmia and cachexia; and combining an altered state of the blood with a depraved state of the secretions.

SYMPTOMS.—A greenish-yellow pallor of the skin, puffiness, and often œdema of the integument; heaviness; listlessness; fatigue on the least exertion; palpitations of the heart; throbbing of the carotid arteries; shortness of breath; pains in the back, loins, and hips; indigestion, with flatulency and acidity in the stomach; offensive breath, and a disordered state of bowels.

The appetite is often singularly depraved; lime, chalk, and other absorbents are sometimes greedily eaten, and the accustomed food rejected. The bowels are sometimes costive, sometimes relaxed, or the two states alternate; the evacuations are generally offensive. As the disease advances, the lips lose their colour; the eyes are encircled with a livid areola, the face becomes pale, and assumes a dusky yellowish hue; the feet are affected with œdematous swellings; and there is every indication of want of power and energy in the constitution. The breathing is hurried by the slightest exertion; and the pulse is small, quick, and frequent. Symptoms of hysteria are often present, with cough, and sometimes with confirmed hectic fever.

CAUSES.—Those of anæmia and cachexia combined. Amenorrhœa is a general, though not a constant, accompaniment.

TREATMENT.—That proper to anæmia and cachexia combined. We should endeavour: I. To restore the normal character of the blood by the means recommended in the treatment of chronic anæmia. II. To correct the depraved secretions, which may be effected by gentle aloetic aperients, combined with myrrh and a little blue pill.

In the common run of cases the pills of steel and gentian may be given twice or thrice daily, and one or two of the compound rhubarb pills every night.

The menstrual discharge may, in most cases, be safely left to itself; but if any urgent symptoms connected with the functions of the uterus be present, they must be treated by the remedies pointed out under amenorrhœa, dysmenorrhœa, &c.

CACHEXIA—BAD HABIT OF BODY.

SYNONYM.—Cachexy.

DEFINITION.—An unhealthy state of system, allied to anæmia, and due to some poison gradually introduced into the body, or generated within the body itself, circulating in the blood, and giving rise to important changes in its composition.

VARIETIES.—Syphilitic Cachexia. Alcoholic Cachexia. Marsh Cachexia. Tubercular Cachexia (Tuberculosis). Carcinomatous Cachexia. Cachexia of hot climates. Leucocythæmia. Supra-renal cachexia.

SYMPTOMS.—A sallow, dusky, or muddy complexion, often tinged with yellow; a dry and harsh skin; a small, frequent, and compressible pulse; the tongue sometimes clean, moist, and red, sometimes pale, but more commonly furred, or cracked; the appetite capricious, often craving and voracious, with the attendant dyspeptic symptoms; the bowels sometimes costive, and requiring the frequent use of aperients, but more usually loose, with dark, slimy, and offensive fecal discharges; the urine variable in character, but generally high coloured, of a strong odour, and depositing amorphous lithates; the perspiration and breath offensive. Enlarged tonsils, aphthæ, and cutaneous eruptions, are frequent concomitants of this state, as are also obscure and wandering pains of the body and limbs.

TERMINATIONS.—In organic diseases of the internal viscera, especially the lungs, liver, and kidneys; these diseases being often complicated with ascites or anasarca.

CAUSES.—*Predisposing*. Debility in infancy, and hereditary defect of constitution. *Exciting*. Unwholesome diet; want of proper exercise; intemperance; continued exposure to marsh miasma, to a cold, damp atmosphere, or to unhealthy climates; the impure air of crowded cities; the gradual operation of mineral poisons, such as mercury, lead, copper, and arsenic; and of animal poisons, especially the syphilitic virus.

DIAGNOSIS.—From simple *anæmia* by the sallow, dusky, or muddy complexion, as distinguished from the clear and pale skin; by the strongly-marked dyspeptic symptoms; and by the depraved character of the secretions and excretions.

PROGNOSIS.—*Favourable*, if the patient can be removed from the influence of the ascertained cause, and in the absence of organic disease; *unfavourable*, when complicated with severe visceral disease.

TREATMENT.—*Indications*. I. To remove the exciting cause. II. To improve the condition of the circulating fluid.

I. The exciting cause may be removed in the several cases specified by proper diet, exercise, change of air, ventilation of apartments in which unhealthy occupations are carried on, change from unwholesome employments to healthy occupations. In the case of syphilitic cachexy

a new action must be induced in the system by preparations of mercury, or of iodine.

II. The condition of the circulating fluid may be improved by proper diet, consisting of a due mixture of animal and vegetable food. The condition of the digestive, cutaneous, urinary, and uterine functions must be carefully inquired into, and the nature of the secretions determined. If the bile be vitiated and defective, alkalies combined with tonics, and mercurial purgatives should be given. The condition of the urine will generally indicate the treatment which should be adopted. If it be loaded with phosphates or oxalates, the mineral acids may be given in combination with quinine. If lithates be present, alkalis, with tonic and stimulant infusions, are required. The skin must be roused into healthy action by means of daily shower or sponge baths, followed by friction of the surface with a brush or coarse towel. If the temperature be low an occasional hot bath should be taken at bedtime. Change of air and of scene, and a course of mineral waters, especially the chalybeates, may be resorted to with the greatest benefit, or a course of saline waters may be followed by a course of chalybeate waters. In the intemperate, the gradual diminution and ultimate abandonment of the use of spirituous liquors must be insisted on.

Of the varieties of cachexia specified above, some will be found sufficiently described under the diseases which produce them: others, as leucocythæmia, and supra-renal cachexia, may be briefly described with advantage.

LEUCOCYTHÆMIA, LEUKÆMIA, LYMPHÆMIA, is a form of cachectic anæmia, for a knowledge of which we are indebted to Dr. Bennett of Edinburgh. The disease derives its name from the excess of white corpuscles existing in the blood. It is characterised by great pallor of surface, accompanied in some cases by œdema, or by dropsical effusions of greater or less extent. The functions of the stomach and bowels are generally deranged, and jaundice is sometimes present. There is great weakness and emaciation, shortness of breath, and, in cases of long standing, hectic fever. The blood is found to contain white corpuscles in great excess. The disease is generally one of adult life, and is commonly associated with disease of the abdominal viscera, especially of the spleen, which is often greatly enlarged, and less frequently of the liver. Disease of the lymphatic glands is also a common accompaniment. The disease is essentially chronic, and the prognosis unfavourable, except in those rare cases in which the viscera are not seriously affected. The cause of the disease is sometimes to be found in severe attacks of the remittent or intermittent fevers of hot climates, leaving behind them disease of the liver and spleen. The treatment will consist in the simultaneous use of preparations of iron, and of the remedies indicated for the concomitant visceral disease.

Virehow distinguishes two forms of leukæmia, the *splenic* and the *lymphatic*, the spleen being the starting-point of the disease in the one case, and in the other some portion of the lymphatic glands. In the splenic form the white corpuscles of the blood are comparatively large,

well-developed cells, with one or more nuclei closely resembling the cells of the spleen. In the lymphatic form the white blood corpuscles are small, and each possessed of a single, somewhat granular nucleus, with which the cell-wall is in very close apposition. "In many instances it looks as if perfectly free nuclei were contained in the blood."

CACHEXIA OF HOT CLIMATES.—This condition, which is sometimes described as anæmia, is of common occurrence in Europeans resident in hot climates: sometimes as the consequence of organic disease of the abdominal viscera brought on by previous attacks of intermittent or remittent fever; sometimes as the result of a prolonged residence in unhealthy localities without any precedent organic malady; sometimes, again, as the sequel of febrile attacks which have not been followed by organic mischief. It may also be induced by the injudicious use of the lancet, or by attacks of diarrhœa, cholera, dysentery, scurvy, or hepatitis. The leading symptoms are, a pale and sallow countenance, a cold and shrivelled skin, a pearly whiteness of the eye, a dilated pupil, a dull and languid expression of features, a peevish temper, and a despondent state of mind. The belly is generally swollen, and the extremities often œdematous, the digestion weak, the bowels torpid, the tongue pale, and coated with a white fur, the pulse feeble, and the respiration easily quickened by exertion. The treatment proper for this state consists in the use of the preparations of iron, with aloetic aperients, if required, and such local treatment as the visceral complications require, with strict attention to all the means of preserving health. A dry and bracing air, mental rest, and suitable bodily exercise must be particularly insisted on. Preparations of mercury are contra-indicated.

I have, in one or two instances, seen this state of system following service in hot climates and attacks of intermittent or remittent fever, without, however, any serious disease of the liver or spleen, speedily and entirely cured by the use of preparations of steel. (G.)

For cases, see 'Anæmia,' in Martin's 'Influence of Tropical Climates on European Constitutions.'

SUPRA-RENAL CACHEXIA.—This disease, also known as *supra-renal melasma*, and (from the name of the physician who first drew attention to it) *Morbus Addisonii*, is a form of cachexia characterised, like leucocythæmia, by great pallor of surface, pearly whiteness of the conjunctiva, great languor and debility, loss of appetite, an uneasy feeling at the pit of the stomach, and sometimes vomiting of food, feeble pulse, and some degree of emaciation. This anæmic and cachectic state is accompanied by a peculiar and characteristic discoloration of the skin over the whole surface of the body, but more particularly on the face and neck and under the eyes, on the penis and scrotum, the armpit and navel, the epigastrium and upper extremities. The skin has a smoky appearance, and presents every shade of colour from amber to a dark chestnut, or even a chocolate colour. It is sometimes blended with spots or patches of morbid whiteness. The discoloration may also affect the inside of the cheeks and the lips, which sometimes have the appearance caused by eating mulberries. The cases in which this discoloration is extensive

and strongly marked, end fatally, and, in most instances, reveal after death a diseased condition of the supra-renal capsules, consisting either in acute inflammation ending in abscess, or in atrophy or hypertrophy. Sometimes these organs are the seat of tubercular or carcinomatous degeneration, or of cretaceous deposits. We believe, however, that attention has been too exclusively directed to the condition of these parts, and that the cause of the cachectic state will often be found in some change in the structure of the liver. We have certainly seen a typical case of bronzed skin with intense anæmia caused by an altered and atrophied condition of the hepatic cells, the supra-renal capsules remaining perfectly healthy. (J. H.) In some cases disease of the supra-renal capsules only has been discoverable after death; but in others disease of the lungs, spleen, or kidneys has been observed. In some instances, again, the mucous membrane of the alimentary canal has been found in the attenuated state common in death by starvation. (Dr. Aitken.) The precise nature of the disease is still unknown, and the treatment, in the absence of such necessary knowledge, must be that of other cases of anæmia or cachexia.

MIMOSIS INQUIETA.—NERVOUS STATE.

SYMPTOMS.—Flushings, tremblings, palpitations, dyspnœa, pain in the left side, giddiness, faintings, loss of recollection, depression of spirits, anxiety, and timidity, are the familiar symptoms of this state, as it occurs in females. In extreme cases, the patient is startled by the slightest noise; is in constant apprehension of death, or of some great evil about to befall her; imagines that she has done something wrong; or is in constant fear that she may commit some great crime. The sleep is often disturbed by frightful dreams. Neuralgic pains, with extreme weakness of the hands and forearms, are of common occurrence, and give rise to an unfounded alarm of paralysis. There are indigestion and flatulence, and the bowels are frequently costive. In other respects the health does not suffer materially. The patient often looks well, does not lose flesh, and may even be of a full habit of body. Hysterical paroxysms are sometimes superadded, and the disease occasionally terminates in mania.

In men the leading symptoms are palpitation, dyspnœa, pain in the left side, depression of spirits, timidity, and disturbed sleep.

CAUSES.—*Predisposing.* A nervous temperament. *Exciting.* In the female, excessive discharges, such as hyperlactation, leucorrhœa, menorrhagia, diarrhœa, and repeated losses of blood; convalescence from severe diseases; and the change of life. In both sexes, fright, grief, anxiety, overwork, scanty nourishment, or fatigue. In men, excessive study, anxiety, dissipation, onanism, and spermatorrhœa.

DIAGNOSIS.—From serious nervous diseases, such as delirium tremens, and mania, by the absence of delirium, and of obstinate delusions.

PROGNOSIS.—Favourable, but recovery generally slow and tedious.

TREATMENT.—I. Ascertain and combat the cause. II. Support the patient's strength by the use of tonics, a generous diet, fresh air, and exercise. III. Allay the nervous irritation by the use of sedatives, such as opium, hyoscyamus, and digitalis, in combination with tonics.

Astringent chalybeates, and the mineral acids in combination with small doses of opium and digitalis, are of great service.

When there is great depression, stimulants in place of tonics.

After great and sudden losses of blood, or after the long continuance of exhausting discharges, opium should be given in full doses.

Bleeding and depressing remedies are contraindicated.

FEBRICULA.—THE FEBRILE STATE.

SYNONYMS.—Simple fever. Feverishness. Febris ephemera.

DEFINITION.—A continued fever, of slight degree and short duration which often runs its course in twenty-four hours.

SYMPTOMS.—Increased heat of skin and frequency of pulse, flushed face, slightly furred tongue, thirst, loss of appetite, restlessness, lassitude, and wandering pains in the head, back, and limbs, are the ordinary symptoms of the febrile state. They are sometimes ushered in by shivering, and generally pass off by perspiration. (For the more severe and prolonged forms of fever, see Chapter III.)

CAUSES.—Fatigue; exposure to cold; heated rooms; intemperance in eating or drinking; slight local inflammation. The contagion of typhus fever acting on a strong constitution, or that of any of the exanthemata acting on a person who has already had the disease.

DIAGNOSIS.—From severe forms of continued fever by the mildness of the symptoms. Caution, however, is necessary in expressing an opinion, as at the first onset of severe cases of continued fever, and of the febrile exanthemata, the symptoms are often not strongly marked.

PROGNOSIS.—Favourable, but guarded, for the reason just stated.

TREATMENT.—*Indications.* I. To remove the cause. II. To abate the febrile action.

I. If the febrile attack have originated in intemperance in eating or drinking, an emetic should be administered.

II. The second indication may be fulfilled by confining the patient to the house, administering a common saline aperient, and substituting a basin of broth for the dinner. In more severe cases, ten grains of Dover's powder may be given at bed-time, followed by a saline aperient in the morning. The patient should keep his bed for a day, and be confined to tea, farinaceous food, and cooling drinks.

CHAPTER II.

PHLOGOSIS	Inflammation.
CONGESTIO	Congestion.
HÆMORRHAGIA	Hæmorrhage.
HYDROPS	Dropsy.
ERYSIPELAS	St. Anthony's Fire.

PHLOGOSIS—INFLAMMATION.

Varieties.—1. Acute. 2. Chronic.

1. ACUTE INFLAMMATION.

SYMPTOMS.—These are—(1.) Local. (2.) General or Constitutional.

(1.) *Local symptoms.* When *external*.—Redness, swelling, heat, and pain. The *redness* arises from the increased quantity of red blood contained in all the vessels of the part; the *swelling* from the same cause, combined with the exsudation of serum, albumen, or lymph; the *heat* exceeds that of other superficial parts, but never rises higher than that of the blood; the *pain* is explained by the larger supply of blood to the nerves of the part, combined with the pressure of the surrounding texture upon them. It is accordingly most severe when the surrounding textures are most unyielding, as in whitlow; comparatively slight, or only produced by external pressure, in the lax mucous membranes.

When *internal*.—The symptoms of inflammation are pain and disturbance of function. The pain, in parts which can be submitted to pressure, is increased by that pressure, and this forms an important means of diagnosis; and, in the less severe forms of inflammation, pain not existing before is sometimes brought out by pressure. The *disturbance of function* in secreting organs, consists in alteration, diminution, or total suppression of their appropriate secretions, according to the degree of the inflammation; in other organs, it consists of various degrees of excitement—in the brain, rapid succession of ideas, mental irritation, delirium; in the eye and ear, intolerance of light and sound, or false sensations, such as flashes of light, musical notes, &c.; in the lungs, dyspnoea; in the heart, palpitation.

(2.) *General or constitutional symptoms.*—In healthy persons, the group of symptoms commonly known as *Inflammatory Fever*; namely, rigors, succeeded by pain in the head, back, and limbs; lassitude; nausea, and loss of appetite; increased heat of surface; thirst; furred

tongue; frequent, full, hard pulse; dry skin; scanty, and high-coloured urine; and constipation. There is a slight aggravation of the symptoms towards evening, and a slight remission in the morning. The sleep is disturbed, and the patient is somewhat delirious. After blood is drawn it is found cupped and buffed.

In severe and extensive inflammation, or in unhealthy persons, the symptoms are those of *Constitutional Irritation*: characterised by extreme anxiety and restlessness; hurried respiration; rigors; a frequent, quick, sharp pulse; low muttering delirium; and, in fatal cases, death by exhaustion.

In the druukard, the symptoms are those of delirium tremens. (See Delirium Tremens.)

In extremely debilitated subjects, those of hectic fever (see Hectic fever), or of the later stage of continued fever (see Typhus fever).

TERMINATIONS.—1. Resolution. 2. Increased secretion. 3. Hæmorrhage. 4. Adhesion. 5. Softening. 6. Induration. 7. Suppuration. 8. Gangrene.

CAUSES.—*Predisposing*. Sanguine temperament; full habit of body; general debility; cachectic and febrile states of system. *Exciting*.—1. Mechanical and chemical irritants. 2. Cold and heat. 3. Certain alterations in the condition of the circulating fluid. 4. Morbid poisons circulating in the blood. 5. The excitement of the circulation in fever. 6. Local congestion, from imperfect elimination of effete matters.

CAUSES WHICH MODIFY THE CHARACTER OF INFLAMMATION:—

1. Texture. 2. Condition of System.

1. *Texture*.—The *serous* membranes in acute inflammation take on the adhesive inflammation, very rarely the suppurative; in less degrees of inflammation, they pour out serum or liquid albumen. The *mucous* membranes secrete mucus, pus, and, in rare cases, coagulable lymph, and are prone to suppuration and to softening, but not to adhesion of opposed surfaces. Inflammation of the *cellular* tissue causes a secretion of serum, and, in higher degrees of inflammation, of coagulable lymph and pus. Its common termination is by *abscess*. Inflammation of the cellular tissue is called *phlegmonous* inflammation. The *parenchymatous* substance of organs is apt to be softened by acute, and hardened by chronic inflammation; it is also liable to abscess and gangrene. Of the *fibrous* tissues, tendon and ligament are prone to gangrene, cartilage to ulceration. *Osseous* inflammation terminates in gangrene (caries and necrosis). The *skin* resembles the mucous membranes in being prone to suppuration. Diffused redness, pimples, and gangrene are also common terminations of cutaneous inflammation. Vesicles, pustules, and spots of ulceration and gangrene also occur on the skin, and constitute a great variety of skin diseases.

The general, or constitutional symptoms of inflammation also vary

materially with the tissue affected. Thus, in inflammation of the *serous membranes*, there is little heat of surface, little muscular debility, little tendency to delirium, unless the serous membranes of the brain be affected; the pulse is hard; there is acute pain, great tolerance of loss of blood, an excess of fibrine, and a cupped and buffed appearance in the blood itself. In inflammation of the *mucous membranes*, on the other hand, there is little pain, little tolerance of loss of blood, no increase of fibrine, and the absence of the cupped and buffed appearance. There is, however, an exception to this rule in the case of croup, of diphtheria, and of certain rare diseases of the mucous membrane of the lungs and bowels, in which the mucous membrane takes on one characteristic feature of inflammation of the serous membranes, namely, the formation of highly tenacious secretions, known as *false membranes*.

2. *Condition of system*.—The effect of condition of system is well illustrated by the exanthemata. In *measles*, the inflammation which prevails is similar to that produced by a common cold, and, in severe cases, leads to the effusion of coagulable lymph from the larynx and trachea; in *scarlatina*, there is a disposition to ulceration in the mucous membrane of the pharynx and adjoining parts; in *small-pox*, the inflammation leads to gangrene, followed by suppuration around the dead points. Another illustration of the modifications produced by states of system, is afforded by common inflammation of the skin contrasted with erysipelatous inflammation.

It is of the utmost importance that the practitioner should be familiar with the constitutional symptoms which mark the several terminations of inflammation. *Acute adhesive inflammation* is accompanied by a full, strong, and hard, or a small wiry pulse, somewhat increased in frequency, little or no heat of skin, little or no headache, vertigo, or delirium, no muscular tremor or debility, slight change in the character of the urine, and great tolerance of bloodletting. *Suppuration* is announced by darting and excruciating pains, by severe, and often by repeated rigor, occurring in some cases almost with the regularity of ague, and followed by heat and sweating—the symptoms, in fact, of hectic fever. *Gangrene* is indicated by a sudden cessation of pain, by collapse of the entire system, pallor, cold clammy sweat, sunken features, sometimes low delirium, sometimes peculiar self-possession. A dry, brown tongue, sordes on the teeth, a small frequent, feeble pulse, and the other symptoms of the typhous state, often precede the fatal termination of extensive or long-continued inflammations.

TREATMENT.—The remedies employed in the treatment of *acute inflammation* are either general or local. The *general remedies* are bloodletting by venesection or arteriotomy, the tartarated antimony, in full doses of a fourth of a grain or more, and the preparations of mercury, especially calomel and blue pill, administered in repeated doses, so as to affect the system. In slight inflammations the use of strong saline aperients will be sufficient. In internal inflamma-

tions, general and local bloodletting, tartarized antimony, mercurry, and counter-irritants are the remedies most in use. The *local remedies* are depletion by leeches, cupping, or scarification; incisions into the part; cold, cataplasms and fomentations, and counter-irritants. Inflammation of exposed mucous surfaces is often treated by strong irritants, such as nitrate of silver, which have the effect of promoting the contraction of the dilated vessels. Another effective local remedy is pressure, which has been applied with advantage in orchitis and in anthrax.

2. CHRONIC INFLAMMATION.

SYMPTOMS.—Those of the acute form, but of lesser intensity, and longer duration. The redness is of a more dusky hue; the heat little, if at all, above the natural standard, and the pain very slight, or only produced by pressure. The functions of internal parts which are the seat of chronic inflammation, are generally languidly performed, and their secretions are diminished in quantity. In chronic inflammation of the cellular tissue, serous effusion takes the place of the more complex products of acute inflammation.

TREATMENT.—In *chronic* inflammation, local remedies alone are employed, the general remedies being used to improve the health, and not for the purpose of removing the inflammatory action. The local remedies most in use are, moderate depletion by leeches or cupping, stimulants, which have the effect of causing the capillaries to contract, and counter-irritants. Of stimulants, the most efficacious are nitrate of silver, tincture of iodine, iodine ointment, &c., applied over and around the inflamed part. The capillaries may also be caused to contract, and chronic effusions may be removed, by the cold douche, or by electric shocks passed through the part affected. In chronic inflammation of the lower extremities, a graduated pressure is also of great service, by supporting the relaxed vessels.

CONGESTIO—CONGESTION.

VARIETIES.—1. Active. 2. Passive.

1. ACTIVE CONGESTION.

SYNONYMS.—Arterial Congestion. Sthenic Hyperæmia. Active Hyperæmia.

CHARACTERS.—Active congestion consists in a local fulness of the small vessels, analogous to that general fulness of the vessels of the entire body which constitutes plethora. This fulness of the small vessels is accompanied by a more rapid flow of blood through them, and is marked by the same florid redness which is present in inflammation.

TERMINATIONS.—In inflammation. In active hæmorrhage. In dropsy. In passive congestion.

TREATMENT.—When congestion threatens to run on into inflammation, the moderate and cautious abstraction of blood from the part by

leeches or cupping, a position favourable to the return of blood to the heart, the local application of cold, counter-irritants, and the administration of saline aperients and tonic stimulants, are indicated.

2. PASSIVE CONGESTION.

SYNONYMS.—Venous congestion. Passive hyperæmia. Asthenic hyperæmia.

CHARACTERS.—An overloaded state of the capillaries and small veins, with a languid circulation of blood through the part, which is of a dusky hue.

TERMINATIONS.—In active congestion, passing on into inflammation. In oppressed and sluggish function of the part affected. In dropsy. In passive hæmorrhages, leading to chronic ulcers of the extremities.

CAUSES.—Mechanical pressure. Constitutional debility. A position unfavourable to the free return of blood to the heart. Cold. Imperfect action of secreting and excreting organs.

TREATMENT.—Mechanical support. Tonics or stimulants, according to the degree of the existing debility. A position favourable to the return of blood to the heart. In congestion of the mucous membranes, and in congestion or chronic ulceration of the integuments, the use of stimulant and astringent applications. Friction. The moderate use of aperient medicines, to relieve the general circulation.

HÆMORRHAGIA—HÆMORRHAGE.

VARIETIES.—*General and Local.* Arterial and venous. Active and passive. Vicarious. Traumatic. Congestive.

When hæmorrhage arises in healthy states of system from strong action of the heart, it is called *active* hæmorrhage; when from a weakened state of capillaries, *passive* hæmorrhage: that which arises from congestion might be termed with equal propriety *congestive* hæmorrhage.

1. ACTIVE HÆMORRHAGE.

CHARACTERS.—A sudden or rapid and abundant discharge of vermilion-coloured blood.

CAUSES.—*Predisposing.* Youth and vigour. Plethora. *Exciting.* All excitements of the circulation by violent muscular exertion; the abuse of spirituous liquors; violent passions and emotions of the mind. The *immediate* cause may be the rupture of a large artery or of an aneurismal sac; active congestion of a mucous surface leading to extravasation through the capillary vessels; the laying bare of an artery by ulceration; and severe wounds.

TREATMENT.—The antiphlogistic regimen, as in acute inflammation—abstraction of blood from the arm, nauseating doses of tartar emetic,

brisk saline aperients, and low diet. A position unfavourable to the flow of blood towards the seat of the hæmorrhage. Quiet and rest of the part affected. Cool air and cooling drinks. Cold applications. Ice. Styptics. The destruction of the bleeding surface by the use of caustics, strong nitric acid, or the actual cautery. The antiphlogistic portion of the treatment should be omitted in all cases of active hæmorrhage occurring in debilitated constitutions. In these cases, in addition to a proper posture, rest, cool air, and cooling drinks, astringent medicines should be prescribed, such as the mineral acids, especially sulphuric acid, the preparations of zinc and lead, and vegetable substances containing tannin or gallic acid. In all cases of extreme debility, with great pallor of surface, brought on by excessive hæmorrhage, opium and its preparations in full doses are indicated, either by themselves or in combination with astringent medicines, such as the dilute mineral acids, acetate of lead with excess of acetic acid, tannic or gallic acids.

2. PASSIVE HÆMORRHAGE.

CHARACTERS.—A slow discharge of dark-coloured blood by extravasation from mucous membranes, and from surfaces in a state of passive congestion.

CAUSES.—*Predisposing.* Debility. Old age. *Exciting.* Passive congestion. Mechanical obstacles to the return of blood by the veins.

TREATMENT.—The removal of obstructions to the flow of blood. A favourable position. Rest. Astringent applications. The internal use of tonics or stimulants according to the degree of existing debility.

HYDROPS—DROPSY.

SYNONYM.—Anasarca.

DEFINITION.—An effusion of serum into the interstices of the areolar tissue, with or without effusion into serous cavities.

Edema is the term given to local effusions into the areolar tissue. Effusions into the several cavities of the body are respectively called *hydrocephalus*, *hydrocrachis*, *hydrothorax*, *hydropericardium*, *ascites*, *ovarian dropsy*, *hydrocele*.

VARIETIES.—The varieties of dropsy are dependent upon their cause. Thus there exist (1) dropsy from debility, (2) febrile dropsy, (3) pulmonary dropsy, (4) cardiac dropsy, (5) renal dropsy.

SYMPTOMS.—The disease generally comes on in the lower extremities, and first shows itself towards evening with a swelling of the feet and ankles, which disappears after lying down. By degrees the swelling becomes permanent, ascends, and successively occupies the thighs, the integuments of the trunk, the penis, and scrotum, and in females the labia. In extreme cases the dropsical effusion extends to the upper extremities, and to the integuments of the chest, neck, and face, and it is often accompanied by ascites and hydrothorax. The parts occupied

by the fluid *pit* on pressure with the finger. The urine is scanty, high-coloured, and deposits lithates; sometimes, however, it is of a pale whey colour, and more copious. The skin is pallid like marble, cold, and dry, and when the effusion is great, it becomes tense and shining. By-and-by it gives way at several points, the water oozes out, and the contiguous skin becomes red and excoriated; sometimes it is raised up into small blisters, sometimes it sloughs. The other symptoms vary with the cause of the dropsy; dyspnoea, palpitation, flatulence, and drowsiness are common.

With a view to prognosis and treatment it is of the utmost importance to ascertain the cause of the dropsy, and thus to distinguish the different varieties of the disease. In some cases the acumen of the physician will be severely tested. The following are the chief points to be attended to:—1. If the dropsy be purely local or asymmetrical, it is dependent upon *mechanical obstruction* of a particular large vein—*e. g.*, œdema of head, neck, and upper extremities may be due to an aneurismal or other tumour pressing against the descending cava. Œdema of the leg may arise from pressure by a cancerous mass in the pelvis upon the corresponding iliac vein. 2. *Dropsy from debility* will be recognised by attention to the previous history of the patient. He has had neither rheumatism nor scarlet fever, and there are no present symptoms of organic disease of either of the great organs. There may be a soft bruit at the base of the heart; but we shall have no great difficulty in assigning this to its proper cause—anæmia. 3. *Acute or febrile dropsy* is known by its sudden appearance following exposure to cold, as when a person, after violent-exercise and in a profuse perspiration, falls asleep on the cold damp ground; or when, during recovery from scarlatina, the action of the skin is checked by exposure to cold wind, or rain. 4. *Pulmonary dropsy* generally supervenes upon an acute attack of general bronchitis in one who has long suffered from emphysema. In other cases we may detect consolidation of the lung from cancer or tubercle, or the lungs themselves may be œdematous from local debility of their structure. 5. *Cardiac dropsy* is most commonly due to disease of the valves of the heart allowing of regurgitation of the blood, and resulting in obstruction to the entrance of venous blood into the lungs, and consequent congestion of the venous system. Occasionally the cause lies in a fatty heart. Abnormal heart-sounds and a feeble, intermittent pulse point out these conditions. 6. *Renal dropsy* will be indicated by the absence of severe cardiac and pulmonary symptoms, and by the condition of the urine. Mere congestion of the kidney, as indicated by scanty, bloody urine, is the cause of febrile dropsy. Graver diseases of the kidney are indicated by pale whey-coloured albuminous urine, sometimes scant, sometimes voluminous, depositing a little flocculent matter composed of epithelial, waxy, or fatty-waxy casts of the uriniferous tubules.

PROGNOSIS.—When not dependent on organic disease, generally favourable. When dependent on organic disease of long standing, and great severity, unfavourable.

TREATMENT.—*Indications.* I. To remove the cause. II. To diminish the quantity of the dropsical effusion. III. To relieve urgent symptoms by the discharge of the fluid.

I. In inflammatory dropsy and dropsy dependent on febrile action the remedies for inflammation and fever are indicated; in dropsy dependent on debility, tonics or stimulants according to the degree of the debility; in dropsy dependent on venous congestion, moderate depletion to relieve the vessels, and regulated pressure to afford support; in congestive dropsy dependent on organic disease, medicines directed to relieve the disease which causes the congestion; and in dropsy from organic disease leading to an alteration in the constituent principles of the blood, a treatment appropriate to the disease in question.

II. The quantity of the dropsical effusion may be diminished by remedies which increase the secretions from the skin, kidneys, and bowels—by sudorifics, diuretics, and purgatives adapted to the existing state of the patient. Among sudorifics, the salines are to be preferred, such as nitrate of potass, acetate of ammonia, &c.; among diuretics, the salts of potass or soda, in combination with some of the diuretic infusions or decoctions; and among purgatives, the saline aperients, the compound jalap powder in doses of from gr. xx. to ℥ss,* and the extract of elaterium in doses of from gr. $\frac{1}{4}$ to gr. i. The doses and strength of the several remedies must be regulated by the state of the patient, the sudorifics and diuretics belonging to the class of depressants being preferred in inflammatory and febrile dropsy, and in comparatively vigorous states of the system; and sudorifics and diuretics belonging to the class of stimulants in states of debility. The saline purgatives will be more appropriate in the latter form of the disease, and more drastic purgatives in the former. Cardiac, hepatic, and renal dropsy also require modifications of treatment, and remedies adapted to the primary disease. (See the Diseases of the Heart, Liver, and Kidney.)

III. When dropsical accumulations interfere mechanically with the functions of surrounding parts, it may be necessary to resort to operations in order to discharge the fluid,—to puncture with a round needle, in anasæra threatening to discharge itself by vesication, or ulceration of the skin; in ascites to perform paracentesis abdominis; in hydrothorax paracentesis thoracis; in hydrocele to resort to tapping, followed by stimulant injections to effect a radical cure.

Hepatic and the various local dropsies will be treated in the following pages under the heads of *ascites*, *hydrothorax*, *hydrocephalus*, &c.

The strong analogy which exists between the state of the vessels in acute inflammation, in active hæmorrhage, and in inflammatory dropsy, makes the indications for the treatment of one to be nearly identical with those for the treatment of all the rest, and the same observation applies to chronic inflammation, passive hæmorrhage, and dropsy from debility. The state of the vessels in congestion, too, is the same, whether they pour out blood or serum. The principles of the treatment are the same in either case.

* ℥=100 grains.

ERYSIPELAS—ST. ANTHONY'S FIRE.

DEFINITION.—A contagious and infectious malady, epidemic at certain seasons, consisting in an inflammation of the skin, or of the skin and cellular tissue, spreading from a single centre over a greater or less extent of surface, and subsiding, or disappearing in one part as it extends to another.

SPECIES.—1. Idiopathic erysipelas. 2. Traumatic erysipelas.

1. IDIOPATHIC ERYSIPELAS.

SYMPTOMS.—The disease usually sets in with rigors, and other symptoms of pyrexia; with confusion of intellect, and sometimes with delirium or coma. There is nausea, and, in some cases, vomiting; in others diarrhoea; the tongue is moist, and covered with an uniform white fur; and the pulse is frequent, quick, full, and compressible. After a variable interval of a few hours, or of one or two days, a red spot, accompanied by more or less swelling, appears upon the skin. From this centre an inflammatory blush of a rosy, bright scarlet, or dusky red colour spreads more or less rapidly, fading away into the healthy skin so as to be separated by no line of demarcation from it, or more rarely terminating abruptly, and being bounded by a distinct margin elevated slightly above the level of the sound skin, and at length occupying a large extent of surface. The colour disappears under the pressure of the finger, but returns when the pressure is removed. There is considerable swelling, and a peculiar acrid heat of the inflamed parts. As the redness extends, it disappears from, or gradually subsides in, the parts first occupied. After a longer or shorter time the inflammation usually terminates in desquamation of the cuticle, or in the formation of vesicles of variable size, containing a yellowish serum or lymph. The fever is in proportion to the extent of the disease, and only declines after it has ceased to spread, when, in favourable cases, the patient rapidly regains his appetite and strength. In unfavourable cases, the fever assumes the typhous character, passes through the several stages, and displays many of the symptoms described under 'Typhus Fever' (see page 320), and the patient sinks comatose or exhausted from the fifth to the tenth day; rarely so late as the fourteenth or twenty-first.

TERMINATIONS.—1. Resolution (*erysipelas mitius*). 2. Vesication and desquamation of the cuticle. 3. Edema (*erysipelas oedematodes*). 4. Inflammation of cellular membrane (*erysipelas phlegmonodes*), with consequent suppuration, or gangrene (*erysipelas gangrenosum*). 5. Metastasis to internal organs, especially to their serous investments. 6. The disease sometimes suddenly leaves one part of the surface, and attacks a distant part (*erysipelas erraticum*). 7. Inflammation of the brain and its membranes. 8. Inflammation and suppuration of the mucous membrane of portions of the intestinal canal. 9. Inflammatory oedema of the glottis producing suffocation.

Parts affected by the disease.—The face is the most common seat of idiopathic erysipelas. It is also of frequent occurrence on the lower extremities. That which follows wounds (traumatic erysipelas) may occur on any part of the body.

Erysipelas of the face (*erysipelas faciei*) is by far the most common form of the disease. It commonly begins on the nose, and thence gradually extends over the entire face, causing great swelling of the nose and eyelids, and, in extreme cases, giving rise to horrible disfigurement. Sometimes it descends and spreads over the neck and trunk, but more commonly attacks the scalp. In its passage over the head, the membranes of the brain are often more or less affected, and there is acute headache, accompanied sometimes by delirium of the violent or of the muttering kind, according as the accompanying fever is of the inflammatory or typhous type; and occasionally terminating in coma. From the head it generally extends down the back, and sometimes affects the membranes of the spinal cord. In severe cases, traces of the affection of the membranes of the brain and spinal cord remain for some time after the recovery of the patient, and are shown by mental excitement, and by numbness and spasmodic twitchings of the extremities. Erysipelas of the head and face is generally accompanied by more or less inflammation and redness of the throat, and in rare instances it proves fatal by inducing serous effusion into the submucous tissue of the glottis and epiglottis.

CAUSES.—*Predisposing.* A full plethoric habit; constitutional peculiarity; previous affections of the same nature. The adult age: debilitating diseases, such as dropsy, renal dropsy especially, fever, or the febrile exanthemata.

Exciting.—Contagion; cold; excessive heat, or vicissitudes of temperature; exposure to the rays of the sun; abuse of fermented liquors; suppressed evacuations; the presence of irritating matter in the primæ viæ; wounds or local inflammation of the common kind occurring in certain constitutions, in certain seasons, and in places where the disease already exists. It is often epidemic during spring and autumn, and frequently prevails in hospitals, gaols, and other crowded situations. It is also a frequent concomitant of puerperal fever.

DIAGNOSIS.—From erythema by the duskier blush, pain, and swelling, and by the presence of severe pyrexia. Erythema nodosum does not tend to diffuse itself, and is never accompanied by pyrexia. Acute eczema is liable to be confounded with erysipelas. It is distinguished by the presence of a minute vesicular eruption.

PROGNOSIS.—*Favourable.* The fever purely inflammatory; a rosy or bright scarlet colour of the diseased skin; not extending over a large surface; no vesications: the febrile symptoms diminishing with the disappearance of the blush; and this, soon after, assuming a yellowish hue, with an abatement of the swelling. The adult age. *Unfavourable.*—The fever assuming the typhous form; the inflammation be-

coming of a dark rose-colour; its sudden recession from the surface, and invasion of an internal part; its extension over a large surface without leaving the part it originally occupied; livid vesications; weak, rapid, irregular pulse; great prostration of strength; early appearance of coma; the disease being epidemic; original or acquired debility of constitution; complication of the disease with dropsy, jaundice, or other affections originating in organic disease. Infancy and old age.

CONTAGION—INFECTION.—The disease chiefly spreads by contact; it is doubtful whether it is ever propagated through the air. It may be inoculated, and it is conveyed by fomites. It may attack the same person several times, and may coexist with other severe diseases: its period of incubation from a few hours to two or three weeks. It is an epidemic malady, and rages in some years with extreme violence.

MORTALITY.—The deaths in the metropolis, in a million of persons of all ages, vary from 110 to 260, and average 160. The rate of mortality among persons attacked varies with the severity of the epidemic, from one in three to one in ten; or it is even less.

TREATMENT.—*Indications.* 1. To reduce the arterial action, if the fever be of the inflammatory kind.

II. To support the strength of the patient, if it assume the typhous character.

III. To obviate the tendency to a determination to the head or other important organs.

IV. To subdue inflammation, and promote salutary changes in the part affected.

I. High action, if present, is to be reduced.

(a) By *bleeding*.—This operation is, however, to be adopted with the greatest care, for it seldom happens that the fever is purely inflammatory. When, however, the subject is young, in the country, the constitution unimpaired, and the symptomatic fever high, the lancet may be resorted to with advantage; on the other hand, in persons accustomed to the air and living of a large town, and more especially if the constitution has suffered, or is naturally weak, the abstraction of blood is contra-indicated. It will very rarely be required in erysipelas of the face.

(b) By mercurial and saline aperients. In robust habits, five grains of calomel and five grains of extract of colocynth, followed by the black dose, may be administered at the outset, and from time to time, if requisite; in other cases from three to five grains of blue pill, with the same quantity of extract of colocynth, followed by a saline aperient, may be substituted for the stronger medicine.

(c) By *diaphoretics*: such as acetate of ammonia.

(d) By cooling drinks and *dilutents*: as acidulated soda-water, lemonade, tamarind-water, and the like.

(e) By a milk, or farinaceous diet, confinement to the house, or rest in bed.

II. *To support the strength of the patient, if the disease assume the typhous character*, recourse must be freely had to the remedies recommended in typhus—viz., stimulants, as wine and ammonia, and to the stronger stimulants in persons previously accustomed to their use. These may be combined with opium, which is often found very serviceable, even when the brain is affected.

Tincture of the perchloride of iron in doses of xx drops, every three or four hours, is a valuable tonic in erysipelas. Gr. v. of sesquicarbonate of ammonia with ℥iiss of decoction of cinchona may be given occasionally if a diffusible stimulant be required.

When the patient is very restless, tincture of opium may be combined with the foregoing, in doses of from ℥v. to ℥x. or more. But the effect of the opium should be carefully watched.

The treatment of erysipelas will vary, therefore, according to the type of the fever with which it is attended. If it be inflammatory, which it seldom is, the usual means of diminishing inflammation are to be resorted to. If, on the contrary, it assume the typhous character, wine and stimulants are to be relied on, followed during convalescence by bark or quinine. If the patient be seen in an early stage, an emetic should be given and followed by a brisk purgative.

In the inhabitants of large towns, and in epidemic seasons, all cases of erysipelas of any degree of severity are best treated by a milk diet, gentle aperients, the liquor ammoniæ acetatis in half-ounce doses three or four times a day, and a daily allowance of four, six, eight ounces, or a pint of wine. Quinine in two-grain doses may be substituted for the liquor ammoniæ acetatis in the most severe cases. The presence of delirium does not contraindicate the use of wine and quinine, if the other symptoms and the general state of the patient require their use.

III. In cases of head affection with coma and delirium, much relief will be afforded by the application of sinapisms to the feet, mustard pediluvia, or a blister between the shoulders. Diseases of other internal organs must be treated by the remedies applicable to similar idiopathic diseases, taking into account the patient's strength. If the inflammation disappear from the surface, and attack an internal part by *metastasis*, an attempt must be made to re-establish it in the skin by the prompt application of strong stimulants, as mustard poultices, acetum cantharidis, or hot water.

IV. The topical applications are various.

1. The free application of solid nitrate of silver over and immediately around the inflamed part.

2. Light bandaging, or, in the case of erysipelas of the face, the application, by means of a camel-hair brush, of a mixture of two parts of collodion to one of castor oil: this forms a covering protective from the air, and, by its contraction, gives great support to the inflamed part.

3. Warm fomentations, such as a warm decoction of poppy-heads.

4. Cold spirituous applications where the inflammatory action runs high, and they are grateful to the patient.

In phlegmonous erysipelas, the vessels may be relieved in the early stage by leeches, and acupuncture; or by moderate incisions. When suppuration has taken place, free incisions are necessary, and we must use general and local stimulants, poultices, solutions of the chlorides of lime or soda, &c.

PROPHYLAXIS.—Cleanliness, separation, and, if practicable, isolation. Apartments which have been occupied by erysipelatous patients should be whitewashed and thoroughly cleansed. Two causes are rife in the propagation, if not in the generation, of the disease in our hospitals; they are, *the use of sponges in dressing wounds*, and *wet scrubbing of the floors of the wards*. To avoid the first, fine tow should supply the place of sponges, a fresh bit being used for each patient. Sponges used in the operating theatre should be thoroughly washed and subsequently immersed in boiling water after each operation. To avoid the second cause, dry rubbing should be substituted for washing the floors of the wards, which should never be wetted so long as patients are lying above them.

2. TRAUMATIC ERYSIPELAS.

In certain seasons, when idiopathic erysipelas is very prevalent, slight wounds and injuries are apt to be followed by erysipelatous inflammation; and wounds or injuries of a more severe character in persons of unsound constitution, or in the healthy inmates of hospitals or public institutions where the disease already prevails, almost uniformly are subject to this complication. The disease often appears in lines extending from the injured toe or finger along the leg or arm; the lymphatic glands become affected, and those of the axilla, in particular, are liable to diffuse inflammation and suppuration. The symptoms due to traumatic erysipelas do not differ in any important particulars from those of idiopathic erysipelas; but in the prognosis and treatment, the original injury and the consequent erysipelas will have to be jointly considered. The constitutional treatment will be determined mainly by the existing state of system; but, as a general rule, the patient must be supported by a nourishing diet and stimulants, combined with opium in free doses, if great irritation and restlessness prevail. The antiphlogistic treatment is very rarely indicated; and in the inhabitants of large towns perhaps never. * The local treatment, in like manner, will be regulated partly by the condition of the part originally injured and partly by the severity and extent of the erysipelatous inflammation. For the particulars of the local treatment, the reader is referred to works on Surgery.

CHAPTER III.

FEBRES—FEVERS.

CLASS I.

Non-infectious Fevers.

- I. FEBRICULA Febris Ephemera, Ephemeral
Fever (see p. 293).
- II. FEBRIS INTERMITTENS Ague.
- III. FEBRIS REMITTENS Remittent Fever.
- IV. FEBRIS ICTERODES Yellow Fever.

CLASS II.

Infectious Fevers.

- I. TYPHUS Epidemic Continued Fever.
- II. ENTERIC OR TYPHOID
FEVER Endemic Continued Fever.
- III. RELAPSING FEVER Famine Fever.
- IV. THE EXANTHEMATA. (See Chapter IV.)

THE above classification is based upon the most important distinction between fevers; viz., the absence or presence of the power of propagation, when the original exciting cause is removed. The modes of classification in present use are defective. The class termed 'Continued' naturally comprehends the so-called Exanthemata, which are excluded from it. 'Specific' is a still more objectionable class term, for under it we must needs include infectious and non-infectious fevers—continued and intermittent. Of the ultimate nature and relations of the primary causes of fevers we are ignorant. In classifying diseases, however, we should, leaving out of consideration minor symptoms, give to those which have their chief phenomena in common the most natural association which our limited knowledge admits of. With such a principle, the above classification will be found to accord. (J. H.)

GENERAL OBSERVATIONS ON NON-INFECTIOUS FEVERS.

Febricula has been already described. It has its origin in some derangement of the functions of the body. Ague, and remittent and yellow fevers are endemic, and originate in one common external cause; viz., marsh miasma. Apart from their common origin, they have so

many other resemblances that we may safely assume them to be varieties of one and the same disease, the differences being due to the variation in power or intensity of the primary or exciting cause. Thus, if the marsh poison introduced into the system be small in amount, the body suffers only occasionally, a febrile attack coming on every second or third day, or after longer intervals. If the dose be larger, the interval between the paroxysms are shorter and are no longer intermissions—intervals of freedom from fever,—but mere remissions of a more intense febrile condition. If, again, the system have received a still more powerful dose of the paludal poison, then the fever becomes continuous, and those internal organs which in the former cases were, comparatively speaking, only slightly affected, are now fearfully deranged. Between intermittent and remittent fevers, and between remittent and yellow fevers, there are, in truth, no lines of demarcation, they run into each other most completely.

Given a certain source of paludal miasma, the intensity of the fever generated by it will be, *cæteris paribus*, in proportion to the external temperature: In the Arctic regions these fevers are unknown, and the mildest variety of them rarely passes beyond the fifty-sixth degree of latitude. In the latitude of London, and five degrees south of it, the disease assumes the intermittent type; south of this line its character becomes remittent; still nearer the equator, remittent becomes indistinguishable from yellow fever.

These fevers are of great interest and importance to a nation which has soldiers and sailors scattered over the whole of the habitable globe, and serving under circumstances of great exposure, fatigue, and privation. Remittent fever, though by no means unknown in England, assumes in some of our dependencies a character of great malignity, rivalling, and even surpassing, the oriental plague itself in the violence of its attack and the mortality it occasions. The records of our army serving abroad, show that even if we include stations in which the disease is unknown, or of very rare occurrence, one soldier in every eight is attacked by remittent fever, of which number at least one eighth dies. If, however, we exclude from our calculation the stations in which remittent fever is wholly or nearly unknown, the attacks exceed 1 in 7, and the deaths amount to between a seventh and an eighth of those attacked. The mortality, however, varies very widely in different places. In the Tenasserim provinces, it is as low as 1 in 27, at Bombay 1 in 25, at Malta 1 in 24; while it destroys 2 in 11 in Ceylon, 4 in 11 in the Bermudas, and 1 in 2 in Western Africa, on which fatal coast the attacks are nearly equal to the number of soldiers employed.

The disease sometimes derives its title from the places in which it prevails, at other times from some prominent symptom. Thus we have the Walcheren, Levant, and Mediterranean fever; the jungle and hill fever of the East Indies; the lake-fever of America; the Bulam, Sierra Leone, African, and Bengal fever; the gall-fever of the Netherlands; the bilious remittent of the West Indies; and the yellow fever of Jamaica, Gibraltar, and the Bermudas.

The yellow fever, and the more severe forms of the disease, require for their development the combination of marsh effluvia and a temperature exceeding 75° Fahr. The low-lying spots near the coast are its favourite haunts, and it is believed to disappear at an elevation of about 2,500 feet above the level of the sea.

FEBRIS INTERMITTENS—AGUE.

SYNONYMS.—Intermittent fever. Fever and ague.

DEFINITION.—A fever caused by marsh miasma, and consisting of paroxysms,* occurring at regular intervals with perfect intermissions.

VARIETIES.—1. The *Quotidian*; a paroxysm once in 24 hours. 2. The *Tertian*; a paroxysm once in 48 hours. 3. The *Quartan*; a paroxysm once in 72 hours.†

SYMPTOMS.—Ague sometimes attacks a patient suddenly; but in most cases it is ushered in by symptoms similar to those which mark the onset of continued fever; and it is not till after several days, or even one or two weeks, that it assumes its perfect form. It is then recognised by the occurrence, at regular intervals, of a paroxysm consisting of three stages—a cold, a hot, and a sweating stage—following each other with great regularity.

The Cold Stage.—Languor and listlessness; sighing, yawning, and stretching; pallor; blueness of the ears, lips, and nails: shrinking of the features; and constriction of the skin of the whole body (*goose-skin* or *cutis anserina*); a sense of oppression at the pit of the stomach; violent shiverings, chattering of the teeth, and trembling of the limbs; pain in the head, back, and loins; the secretions diminished; the urine scanty, pale, and limpid; the pulse small, frequent, and sometimes irregular; and the respiration short and anxious. These symptoms terminate at length in universal and convulsive shaking.

The Hot Stage.—The heat of the body gradually returns; at first irregularly by transient flushes, which are succeeded by a steady, dry, burning heat, rising much above the natural standard. The skin is

* The period between the end of one paroxysm and the beginning of the next is called the *intermission*: the period occupied by one paroxysm and one intermission is called the *interval*.

† Also, 1. The *double quotidian*, having two paroxysms every day. 2. The *double tertian*, having a paroxysm every day, those of the alternate days being of equal duration and intensity. 3. The *triple tertian*, in which two paroxysms occur on one day, and one on the other. 4. The *duplicated tertian*, which returns twice on each alternate day. 5. The *double quartan*, in which a paroxysm occurs on the day succeeding that of the regular quartan, so that there is a perfect intermission only on the third day. 6. The *duplicated quartan*, in which two paroxysms occur on the day of attack, with two days of intermission. 7. The *triple quartan*, in which a slight paroxysm occurs on each of the usual days of intermission. These forms of ague, as well as those which have longer intervals (such as five, six, seven, eight, nine, or ten days, a month, or a year), and are called *erratics*, require the same treatment as the three primary types.

now swollen, red, and pungent to the touch, the face flushed, and the eyes injected. The sensibility becomes preternaturally acute, and the aching of the head is exchanged for acute pain. The pulse becomes quick, full, and hard; there is great thirst; the urine is scanty and high-coloured.

The Sweating Stage.—At length a moisture breaks out upon the face and neck, which soon becomes a universal and equable perspiration. The heat now descends to its usual standard; the pulse resumes its wonted frequency and usual character; the respiration becomes free and tranquil; the urine deposits a sediment; and the patient is for a time restored to health.

OCCASIONAL SYMPTOMS.—In the cold stage, coma or apoplexy; in the hot stage, delirium. Convulsions, syncope, rigid spasms, neuralgia, jaundice, dysentery, and petechiæ on the skin, have also been recorded. In ague districts, and in persons who have previously had ague, many diseases assume the intermittent character. Of these, hemicrania, or intermittent face-ache, or brow-ague, is the most common. Formerly ague was a very fatal malady; and even at the present day a form of it, known at Smyrna and elsewhere as '*pernicious fever*,' goes on increasing in severity up to the third paroxysm, when it proves fatal.

DURATION OF THE PAROXYSM, &c.—The quotidian is most common in spring, and generally occurs in the morning; usual duration upwards of twelve hours. The tertian is a common type; it occurs both in spring and autumn, and commences at noon: usual duration about eight hours. The quartan is a rare type; it is more severe, occurs in autumn, and generally begins in the afternoon: usual duration about six hours. The quartan has the longest cold stage, the tertian the longest hot stage.

The type is subject to change; tertians and quartans becoming quotidians, and quotidians changing to remittents, and passing occasionally into continued fever.

The paroxysms of ague are sometimes *obscure* (*dumb ague*), sometimes *incomplete*, occasionally *inverted*, sometimes irregular or *erratic*, sometimes *partial*, or affecting only a portion of the body.

PERIOD OF INCUBATION.—From a few hours to several days, weeks, or months. Average duration, from ten days to a fortnight.

PATHOLOGY.—During the cold stage, the blood leaves the capillaries of the surface, and accumulates in the deep-seated large vessels; there is congestion in the head, chest, and abdomen; and the vascular spongy organs, especially the spleen and liver, are liable to suffer, and if the disease last for any length of time, become enlarged and indurated (ague-cake).

TERMINATIONS.—In chronic enlargement, with induration, softening, or suppuration of the liver and spleen; followed by ascites and anasarca; in fatal dysentery; in apoplexy; in fever of the remittent or continued type. In leucocythemia. (See p. 290.)

CAUSES. 1. *Predisposing*. Debility; intemperance; cold and moisture; middle age; male sex; a previous attack. 2. *Exciting*.—Marsh miasma, or the effluvia from decomposing vegetable matter. Also the effluvia from certain soils, impregnated with moisture, but *apparently* free from vegetable decomposition. The danger is greatly increased by exposure to these effluvia at night.

DIAGNOSIS.—Quotidian ague is distinguished from hectic fever by the coincidence, in hectic, of some disease (as pulmonary consumption), of which it is a symptom; by the occurrence of the paroxysm of hectic in the evening; by the clear complexion of hectic, contrasting with the sallow hue of ague; and by the urinary deposit, which in hectic is pink, in ague brown. Strictures of the urethra, and abscesses in the perineum, or in other parts of the body, often give rise to severe shivering fits, followed by flushes of heat and perspiration, resembling the paroxysms of ague.

PROGNOSIS.—*Favourable*. In cold and temperate climates. The paroxysms of short duration, regular in their recurrence, and the intermissions quite free from fever; the postponement of the paroxysms; the short previous duration of the malady; the quotidian and tertian types; an eruption on the lips.—*Unfavourable*. The disease of long standing; the paroxysms anticipating the usual time of their return; a feverish state during the intermission; the paroxysms strongly marked, and of long continuance, and attended with anxiety and delirium; complication with other diseases; enlargement of the liver and spleen; the quartan type.

TREATMENT.—*In the Paroxysm*. During the first or *cold* stage. The patient should be put into a warm bed, and the warmth of the surface be restored as promptly as possible by a hot brick or bottle to the feet, bags of hot bran or salt to the pit of the stomach, aided by friction of the back and limbs, and the administration of warm diluents, such as tea, or weak wine and water. A warm, hot-air, or vapour bath, according to convenience.

During the *second*, or *hot* stage, the remedies employed in the treatment of the first stage should be laid aside, and cool air, cooling drinks, and sponging with cold or warm water should be substituted.

During the *third*, or *sweating* stage, the patient should be protected from cold drafts of air, and kept quiet. After the fit is over, he should wash in warm water, be thoroughly dried, return to bed, and be allowed to sleep; or be supplied with dry, warm clothing. The patient may also take a meal of nourishing food, and if much exhausted, should be allowed stimulant drinks, such as warm brandy, or wine and water.

Local symptoms present during any of the three stages of ague must be treated as the corresponding idiopathic affections.

In the intermission.—The treatment consists in the exhibition of one of those remedies which experience has shown to possess the power of preventing the return of the intermittent paroxysms: of these quinine and arsenic are the most powerful and efficient.

Cinchona bark, or its active principle *quinine*, and arsenic, are specific remedies in ague, and other intermittent disorders. Quinine is the more fitting remedy. The sulphate of quinine may be given in pill, or in mixture with excess of acid, in doses of five, ten, twenty, or even thirty grains daily.

Arsenic may be given in the form of liquor arsenicalis in doses of $\mathfrak{m}\text{v}$, gradually increased to $\mathfrak{m}\text{x}$ or $\mathfrak{m}\text{xx}$, either alone or in combination with laudanum, every four hours during the period of intermission. Its effects must be carefully watched.

Previous to the administration of the specific remedy, the bowels should be freely opened by a brisk aperient, such as v grains each of calomel and colocynth, followed by the black draught.

REMEDIES.—*In the paroxysm, or before it.*—*Bleeding*, during the cold stage. This remedy may be used with advantage in very plethoric subjects, or where there are signs of visceral congestion. *Emetics*, given just before the fit, to prevent its occurrence, or during the cold stage, to hasten the approach of the hot fit. *Laudanum*, either alone or with æther (one drachm of each), may be given with great advantage, before the cold fit, or with more effect during the hot stage. This remedy was strongly recommended by Drs. Trotter and Lind.

In the intermission.—Sulphate of zinc, piperin, salicin, bebeerin, ilicin, camomile flowers, quassia, and other remedies belonging to the class of bitters and tonics, have been substituted for quinine and arsenic. Cures have also been effected by acting on the imagination, or by a sudden shock to the mind.

PROPHYLAXIS.—Avoidance of the air of early morning and evening, and of sleeping-places near the ground. The choice of a habitation on hilly ground, or in such a situation that when the wind is blowing directly from the source of the malaria, the latter may be intercepted by an intervening wood or broad surface of water. Warm and nourishing food before labour in malarious districts. Sailors should not sleep on land in malarious districts; and ships should be stationed at a distance of two or three miles from unhealthy coasts. Small doses of quinine two or three times a day. Thorough drainage.

TREATMENT OF THE SEQUELÆ OF AGUE.—The treatment required for diseases of the spleen and liver is change of air, repeated local depletion, or dry cupping over the part affected, friction with iodine ointment, or the external application of the tincture of iodine, and counter-irritation by blisters or setons. In disease of the liver, gentle mercurial preparations; or nitro-muriatic acid, in doses of from ten to twenty drops in some tonic infusion; or mercurial inunction. When the enlargement of these organs is accompanied by extreme pallor of countenance, preparations of steel, or a course of chalybeate water.

The treatment of hemicrania, of brow-ague, and of those intermittent maladies known as masked ague, *e. g.* intermittent vomiting, diarrhœa, &c., is that of ague itself.

FEBRIS REMITTENS—REMITTENT FEVER.

SYNONYMS.—Bilious remittent fever. Remittent marsh, or paludal fever.

DEFINITION.—A non-infectious fever accompanied by distinct exacerbations of variable duration and severity, but without any complete intermission.

SYMPTOMS.—The premonitory symptoms are those of ague, but the sensation of coldness is a much less prominent symptom. There is not always distinct rigor. The head symptoms are more severe; the countenance is flushed; and there is intense throbbing headache, and occasionally violent delirium. Tenderness of the epigastric and right hypochondriac regions, nausea, and bilious vomiting, with torpid bowels and scanty urine, are among the early symptoms. The alvine discharges are dark, and often greenish, and very offensive. There is withal considerable pyrexia and a dirty brownish tongue. The force and volume of the pulse are liable to great variations.

The febrile condition subsides as the skin moistens and sweat appears, and a remission or moderation of the disease thus occurs. The patient remains in a state of mild fever, accompanied by giddiness and lassitude for about two hours, when the febrile symptoms recur, and slowly increase until they attain their former degree of intensity, or exceed it. Paroxysms and remissions follow each other in regular succession for 7, 14, 21, or 28 days; at the end of either of which periods they may be terminated by a profuse perspiration.

In severe forms of the disease the paroxysms are more intense, the remissions shorter and less marked, the skin becomes yellow and pungent, the tongue covered with a slimy yellow mucus, the stools fetid, and a state of high fever subsides into one of stupor; the strength sinks, the pulse becomes thready, sordes form on the teeth, tendinous spasms are noticed, and stupor passes into fatal coma. This more severe form of remittent fever is indistinguishable from yellow fever.

DURATION.—From five or six days to four or five weeks. Usual duration about a fortnight.

CAUSES.—*Predisposing.* Youth. All causes of debility.—*Exciting.* Marsh miasma, and the exhalations from low damp soils, especially during the summer and autumn months. The disease is most common and most severe in hot climates; but is by no means of rare occurrence in temperate latitudes. In England the disease is rare.

DIAGNOSIS.—From continued fever by the recurrence of intervals of comparative freedom from febrile excitement.

PROGNOSIS.—*Favourable*, in proportion to the distinctness of the remissions. *Unfavourable*, when the fever assumes the continued type, and in proportion to the degree of suppression of the hepatic and renal secretions.

TREATMENT.—The worst forms must be treated in the manner recommended for yellow fever. As soon as the intermissions become well marked, the treatment for intermittent fever must be adopted. Quinine or arsenic may then be given, as in ague, during the remission.

SEQUELÆ.—Diarrhœa and Dysentery.—Enlargement of the liver and spleen, and the anæmic state known as *leucocythæmia*. (See p. 290.)

FEBRIS ICTERODES—YELLOW FEVER.

SYNONYMS.—Typhus synochus icterodes; or Febris remittens gravior cum ictero; Bilious remittent of warm climates; Bulam fever; Mal de Siam; Vomito negro; Vomito prieto; Coup de Barre; &c.

DEFINITION.—A remittent fever accompanied by yellowness of the skin, partial or general, and by vomiting of a black or dark-brown fluid. (The disease assumes, in different epidemics, and often in the same epidemic, the several types of continued, remittent, and intermittent fever, and appears in every degree of severity, from simple ephemeral fever up to the worst forms of the disease. Yellowness of skin and black vomit are characteristics of the fever in its most marked form.)

SYMPTOMS.—The disease commonly sets in with lassitude, listlessness, faintness, and giddiness, with frequent chills, acute pains in the back and limbs, pains in the head and eyeballs, a flushed face, an anxious expression of countenance, an injected, brilliant, and watery eye, and a hot, dry, and harsh skin. The mouth is clammy; the tongue generally white and moist, or watery, furred at the centre, and red at the tip and edges; and the patient is usually very thirsty. The pulse is increased in frequency, full, and hard; the respiration hurried, and interrupted by frequent sighs; there is great tenderness of the epigastrium, with extreme irritability of the stomach, and vomiting of the ingesta mixed with a glairy fluid. The bowels are confined, and the motions often clay-coloured. The urine is sometimes tinged with bile.

After these symptoms have continued, with increasing severity, from a few hours to three days or more, a marked remission takes place, and the symptoms, as well as the sensations of the patient, continue for several hours so much improved as to excite sanguine hopes of recovery. Sometimes the recovery of the patient dates from this remission, but more frequently the improvement is delusive. The febrile symptoms return, accompanied by increased debility; a small and frequent pulse; a cold and clammy skin; a shrinking of the features; a dry tongue, covered with a brown or black fur; increased tenderness of the epigastrium, with an acrid burning sensation extending to the gullet, with extreme irritability of the stomach, and vomiting of all ingesta.

After a further interval of twenty-four or forty-eight hours, and sometimes earlier, the more characteristic symptoms make their appearance. The skin of the trunk assumes a yellow tint, which rapidly extends to the whole body, and to the conjunctiva; the pulse is feeble, unequal, and irregular; the tongue and teeth are incrustated with black

sordes; hæmorrhage takes place from the mouth, ears, nostrils, or bowels; petechiæ appear on the skin; there is incessant hiccup, with black vomit, and dark and gelatinous stools. In fatal cases, death sometimes occurs as early as the third or fourth day, more commonly from the ninth to the eleventh day, but occasionally still later.

Such is the usual course of this disease. But the symptoms and mode of termination are subject to great variation in different countries, in different epidemics, and even in the same epidemic. The following are some of the varieties:—

a. Sudden coma and death in convulsions. *b.* Sudden seizure with black vomit, and death in a few hours. *c.* Intense pain and tenderness in the epigastrium, incessant vomiting, and death from exhaustion. *d.* Great anxiety and restlessness, with a clean tongue and nearly natural pulse, followed after a time by black vomit and death from exhaustion. Death is sometimes sudden, sometimes the sequel of a quiet sleep, sometimes preceded by acute pain and strong convulsions.

SEQUELÆ.—Organic diseases of the lungs, liver, spleen, or other internal viscera. Obstinate dysentery. Slow and tedious convalescence.

CAUSES.—*Predisposing.* Continued hot weather in warm climates. A temperature of not less than from 75° to 80° Fahr. The latter end of summer and beginning of autumn. The climate of the West Indies, of the south of Spain, of the seaports of intertropical America, of Mexico, and of parts of Africa. It occurs more or less frequently, and with greater or less severity, in the West India Islands, at the Havana, at Vera Cruz, at New Orleans, Mobile, Charleston, Baltimore, Philadelphia, and New York, at Gibraltar, and Barcelona. Male sex; intemperance; depressing passions of the mind; all the predisposing causes of common continued fever; especially imprudent exposure to night air. Recent arrival at the place where the disease exists. Want of protection by a previous attack.

Exciting.—Marsh miasma, and decomposition of vegetable matter. The disease is of most common occurrence in swamps at the mouths of rivers, in the low-lying parts of crowded cities, and in ships laden with vegetable produce, or kept in a damp and filthy state.

PERIOD OF INCUBATION.—Less than 10 days.

MORBID ANATOMY.—General yellowness of the skin, sometimes interspersed with blue or livid spots; the brain and its membranes generally healthy, and rarely presenting effusion of serum or blood; red, livid, or dark-black spots and patches on the mucous membrane of the stomach, and in its cavity with an inky black fluid (black vomit). The intestinal canal contains the same black fluid. The intestinal mucous membrane often shows patches of a brown or blackish colour, but no ulcers as in typhoid fever. The gullet is sometimes found inflamed and abraded; the liver is either greatly congested, or small and anæmic; the bladder is contracted and sometimes inflamed. In some epidemics blood has been effused into the structure of the muscles.

DIAGNOSIS.—In mild cases not easily recognized; but in severe cases,

and in the more advanced stages, it is readily identified by the yellow skin and eye, and the black vomit. The pasty covering, with red tip and border, of the tongue, has been mentioned as characteristic of the disease.

PROGNOSIS.—*Favourable.* A regular and steady pulse; a soft and warm skin; a natural expression of countenance; a moist tongue; a free discharge of urine; a distinct remission; natural sleep of 'some hours' duration, undisturbed by vomiting; a miliary eruption on the skin.—*Unfavourable.* A robust and plethoric temperament. Previous intemperance. Recent arrival on the spot where the disease is rife. The early occurrence of any of the characteristic symptoms of the disease, such as yellowness of the skin, especially if it occur in patches, or the black vomit. The existence, in an extreme degree of severity, of any of the leading symptoms: as the aching of the eyeballs; the pain in the back; the tenderness in the epigastrium; the acrid burning sensation in the stomach and œsophagus; the incessant vomiting; deep sighing; singultus; collapse; great coldness of the surface, with a sensation of internal heat; and an irregular or intermittent pulse. Recovery may take place after the appearance of the most unfavourable symptoms, and, on the other hand, "it is known that in persons sitting up in bed amusing themselves, and apparently in a favourable state, the black vomit has suddenly appeared, quickly followed by death, to the utter astonishment of the medical attendants."—*Gillkrest.*

MORTALITY.—Very different in different epidemics. The deaths have amounted to 130 or 131 in 134; 19 in 20; 34 in 35; and 1,265 in 1,739; but they have been as few as 6,684 in 16,517; and even as 1 in 8. English regiments in Gibraltar have suffered a mortality of 1 in 11 and 3 in 11 of the numbers attacked, and in Bermuda of 1 in 3 and 4 in 11. The mortality is generally greatest when the epidemic is recent, and diminishes considerably in the course of time.

TREATMENT.—*Indications.* I. To unload the stomach and insure the free action of the bowels. II. To take advantage of any decided remission. III. To relieve existing symptoms.

I. The stomach should be unloaded at the very commencement by an emetic of sulphate of zinc, in the dose of xx to xxx grs.; or of ipecacuanha in the dose of xx grs. The free exhibition of purgatives is indispensable. They should be repeated, and, if necessary, assisted with clysters, until they have produced at least five or six copious evacuations. The thorough evacuation of the whole of the intestinal canal during the first two hours of the fever cannot be too much insisted on.

The best aperient is croton oil, in the dose of one, two, or three drops, repeated if necessary, and administered at intervals throughout the disease, unless contra-indicated by extreme collapse. It may be placed on the tongue, or given suspended in mucilage.

Ten or twenty grains of calomel, followed in two hours by a saline aperient, or by an ounce of castor-oil, may be substituted for croton oil. Many practitioners depend mainly upon the action of mercury, given not only to unload the liver and intestines, but also to affect the constitution. After the first aperient dose a quarter of a grain com-

combined with opium may be given every two hours, and mercurial ointment may be simultaneously rubbed into the groins and armpits.

II. Whenever there is a marked remission of symptoms one large dose of quinine, such as xx grs., should be administered, or a succession of smaller doses, such as two grains every half-hour or every hour.

III. When the *skin* is universally hot and dry, cold affusion, or cold sponging, is of the greatest advantage, the cold affusion at the outset, and in robust persons; sponging with cold water, in the more advanced stage of the malady, and in the debilitated: the application to be repeated as often as the heat of the skin returns. In applying the cold affusion, the patient is to be seated naked over a proper receptacle, and to have water freely poured over him till he feels chilly, when he is to be wiped dry and placed in bed. When, on the contrary, there is great coldness of surface, the warm bath, at a temperature of 100, or more, and warm frictions, should be employed. *Local determination of blood* may be met by cautious local depletion or by counter-irritation. Bleeding from the arm may be resorted to at the outset of the disease in plethoric subjects, or where comatose symptoms are present. The *sickness* may be met by constantly giving small quantities of arrowroot, or other demulcent fluids, effervescing draughts, ice or ice-water. The *pain in the eyeballs and forehead* may be relieved by cold to the head, the hair having been previously thinned, or the head shaved. *Hæmorrhages* require the use of the mineral acids with bitter infusions; or the acetate of lead, in doses of two grains, with an excess of acetic acid, and from a quarter to half a grain of opium, every two or three hours. *Collapse* must be treated by diffusible stimulants. Extreme *restlessness* in the advanced stages of the disease, and when great debility is present, may be met by opium in doses of one or two grains, combined with from three to five grains of carbonate of ammonia, in an ounce of camphor mixture: the dose to be repeated every two or three hours, if the patient have improved under the first dose; or the opium may be given with 20 or 30 drops of oil of turpentine, suspended in gruel or barley-water. The diet should at first be strictly antiphlogistic; but wine should be given as soon as the patient appears to require support.

When the patient is convalescent, quinine, in the tonic infusions, especially those of eusparia or serpentaria, should be given three or four times a day.

PROPHYLAXIS.—Temperance, a diet containing an excess of vegetable food, cleanliness, regular exercise, non-exposure to the heat of the sun, or to the night air, cold spongings or the shower-bath in the morning, a residence, if possible, on a hill or rising ground, and the avoidance of spots known to be unhealthy, especially during the unhealthy season, are strongly recommended to Europeans in hot climates, particularly when yellow fever prevails. Persons of robust and plethoric habit, newly arrived at a place where yellow fever prevails, should carefully observe all the rules of health; and they should keep the bowels open by the regular use of gentle aperient medicines. The sick should be separated from the healthy; and hospitals should be spacious, cleanly, and well ventilated. Europeans embarking for tropical climates should arrange to arrive at the healthy season of the year.

INFECTIOUS FEVERS.

GENERAL OBSERVATIONS ON INFECTIOUS FEVERS.

Apart from the exanthemata, the investigations of modern observers have led to the separation of infectious fevers into three genera, viz., Typhus, Enteric, and Relapsing. These are collectively called "the continued fevers." We have rejected this term for reasons above stated. The generic distinctness of relapsing fever was only established in the epidemic of 1843, and it was subsequent to this date that a similar distinction was drawn between typhus and enteric fevers. Such a distinction is now generally admitted.

Relapsing fever is an epidemic disease of very occasional occurrence. It appears in times of famine, and is not marked by cutaneous eruption, by which, and by the occurrence of an abrupt cessation of the fever, and a restoration to comparative health for a time, it is sufficiently distinguished from typhus.

Typhus is essentially a "low" fever, being initiated by the most complete prostration, which increases as the disease advances, until the vital powers become reduced to the very lowest ebb. A characteristic rash and head symptoms sufficiently distinguish this fever. Gastric and intestinal symptoms, on the other hand, mark the access and progress of enteric fever, and indicate the severity of the disease.

Typhus, like relapsing fever, is the companion of squalor and want, and is only occasionally epidemic, sometimes disappearing for a long time, and at others prevailing with greater or less severity for three or four years continuously. Of these fevers, typhus is the most infectious; enteric the least so. If the truth were known, it would probably be found that the mortality in typhus and enteric is pretty equal. That of relapsing fever is comparatively small.

TYPHUS—EPIDEMIC CONTINUED FEVER.

SYNONYMS.—If named from its prevailing character—PUTRID, PESTILENT, MALIGNANT, EPIDEMIC, ATAXIC, ASTHENIC, or ADYNAMIC FEVER: if after a leading symptom of the disease—BRAIN FEVER: if after its most common external character—ERUPTIVE, PETECHIAL, MACULATED, or SPOTTED FEVER: if after its presumed cause—CONTAGIOUS, INFECTIOUS: and when named after the places in which it most commonly prevails—PRISON, GAOL, CAMP, SHIP, and HOSPITAL FEVERS, and PARISH INFECTION.

DEFINITION.—A continued fever, of several days' or weeks' continuance, accompanied by extreme prostration of strength, great disturbance of all the bodily and mental functions, and a strong tendency to cerebral complications; and characterised, in most instances, at an early period of the fever, by a peculiar eruption on the skin.

SYMPTOMS.—The onset of continued fever is either sudden and well marked, or gradual and obscure.

In the first case, the disease is generally ushered in by a succession of severe shivering fits, followed by acute pain in the head, aching in the back and limbs, a sense of lassitude and weariness, an unsteady gait, and a disinclination to exertion, whether of mind or body. The surface is cold and pale, the skin contracted, and the pulse either small and weak, or full, quick, and very compressible. The breathing is quickened, and often interrupted by deep sighs. The countenance assumes a dull, anxious, and confused expression, and sometimes closely resembles that of a person in a state of intoxication. The appetite fails; in some cases there is nausea; the bowels are generally confined, and the tongue is covered with a dirty-white fur; the pulse is feeble and fast, but rarely exceeds 120.

In the second case, the symptoms are often so obscure that it is not easy to determine whether the patient is suffering from continued fever, or merely from slight disorder of the digestive organs, or a common cold. He has no well-marked rigors, and no severe pains in the head, back, or limbs; but he is pale, languid, weary, and drowsy, and complains of dull headache; he is disinclined to exertion, and incapable of applying himself to business. His appetite fails; the tongue is covered with a thin white fur, the bowels are constipated, the pulse somewhat increased in frequency; and he passes restless nights, and wakes unrefreshed. This period of uncertainty may last three or four days; and the transition into a state of undoubted fever be so gradual that it may be altogether impossible to fix on any precise time at which the disease may be said to have been first present. The history of the case, by revealing the fact of an exposure of the patient to the contagion of fever, is often the best aid to a correct diagnosis.

This premonitory stage, whether the onset be sudden or gradual, passes more or less rapidly into fully-developed continued fever, marked by pungent heat of skin, frequent pulse, thirst, headache, throbbing of the temples, flushing of the face, suffusion of the eyes, and great restlessness and irritability. The countenance is dusky, and expresses indifference and confusion of mind. Questions are answered slowly, and as if with difficulty, but rationally. The prostration of strength increases, and about the *fourth day* the patient is in bed, lying on his back, and unable to rise without assistance. He sleeps little, his sleep is disturbed by dreams, he mutters, and often starts, and wakes unrefreshed; but in some cases there is great drowsiness; in others there is a total absence of sleep. The tongue, which is at first covered with a moist dirty-white fur, or marked with a dry brown streak along, or on each side of, the middle line, becomes uniformly covered with a dry brown coating. The urine is scanty and high coloured, and is apt to accumulate in the bladder.

About the fifth day, but varying from the fourth to the seventh, a diffused rubcoloid rash makes its appearance on the body. It is usually best developed on the chest and in front of the shoulders. It is occasionally well developed on the backs of the hands, but it is rarely

visible on the face. It usually appears first on the trunk. In some cases and in some epidemics the rash is very faint, and the dusky skin is slightly freckled with a light brownish maculation. In other cases and in other epidemics the skin is thickly speckled and blotched with dusky purple petechial spots. Between these two extremes there is every variation in intensity. When moderately well developed the rash bears a strong resemblance to that of measles, but it has a duskier tint. The individual spots are scarcely elevated above the surface of the skin; their form is irregular; they have no defined limit, but faint away into the duskiess of the surrounding skin. At first they have a florid venous tint, and disappear on pressure; but when they are a day or two old they lose all prominence, become paler, and of a dirty-brown colour, and no longer disappear on pressure. When the number is limited the spots are isolated and scattered; but when the rash is very copious the spots are loosely aggregated together into irregular patches. About the *seventh day* delirium begins to attend the waking hours, and the patient mutters constantly and incoherently, or becomes more violent, and talks loudly and wildly; and at this period of the disease there may be some difficulty in restraining the actions of the patient, but usually his strength does not allow him to get out of bed. The head is intensely hot, and the face and neck suffused with a vivid coppery blush. Still the patient may be aroused, and will open his mouth and fruitlessly attempt to protrude the parched brown tongue, which, and the teeth, are blackened with sordes. The breath and cutaneous exhalation are peculiarly offensive, possessing a rank, cadaverous odour; the former contains free ammonia. The pulse ranges from 90 to 120, and varies in volume; it is always deficient in strength, being soft and compressible. Stupor now begins to alternate with delirium, and the patient lapses into a state of apathy; he is deaf; the expression is vacant; the eyes filmy; the mouth is open; deglutition begins to fail; the hands are tremulous and convulsed, and almost constantly employed in grasping at objects in the air, or in picking the bed-clothes. This critical condition may continue for twenty-four hours or more, and then the patient may begin to rally. If no improvement take place, he sinks into complete coma, in which condition congestion of the lungs very commonly supervenes, and the patient dies suffocated. The crisis occurs about the *fourteenth day*; and if the patient rally, he falls into a sound sleep, the skin regains its warmth, the pulse goes down, and increases in force, the skin and tongue begin to moisten, the patient regains his consciousness, a gentle perspiration sets in, the alvine and urinary secretions become more abundant, the tongue rapidly cleans, and with this improvement in the symptoms there is a craving for food, and the pulse falls to 60 or even 40. If, on the other hand, no amendment be made, the skin rapidly loses heat, and becomes cold and clammy, the toes and fingers become cold and blue, the pulse becomes more frequent, thready, and occasionally imperceptible, the power of deglutition is lost, and the patient lingers on awhile, and then dies insensible.

CONCOMITANT AFFECTIONS. — NERVOUS SYSTEM. — The brain.

is very soon affected in typhus, persistent *headache* being amongst the early symptoms manifested during the first week; the patient moans or cries out from pain in the head. The pain is of a heavy character; it is accompanied by vertigo. Towards the end of the week it decreases and delirium takes its place. Sometimes the delirium is slight and amounts to no more than a little incoherent muttering (typhomania); in other cases it is violent, and may be mistaken for acute mania; and the patient, if not narrowly watched and forcibly restrained, will sometimes effect his escape from his attendants, and throw himself out of window, or place himself in circumstances of great danger. Between these two extremes there is every other degree. The intensity of the delirium is in proportion to the vital power of the patient, acute delirium being more common in the young and robust than in the aged and feeble.

Wakefulness is present in the majority of cases, and if we do not promote sleep, it may be continuously absent for 50 hours or longer.

Somnolency, stupor, apathy, and coma come on in succession as the disease increases in severity; at the same time the *special senses* become much blunted, as is well illustrated in the deafness which invariably accompanies the disease.

General convulsions are rare. They occasionally appear towards the close of the disease; they are often indicative of suppression of the urine. A fatal termination may be expected when such grave symptoms arise.

MUSCULAR SYSTEM.—*Prostration* and a painful sense of weariness are amongst the premonitory symptoms of the disease. *General muscular pains*, simulating acute rheumatism and of considerable intensity, are occasional symptoms in the early stage of the disease. They are apt to mislead us in our diagnosis. Later on, *paralysis* affects the sphincters of the bladder and rectum, and the evacuations are passed in bed, the urine dribbling away from an over-distended bladder. The muscles of mastication, deglutition, and vocalization are similarly affected; the tremulous tongue cannot be protruded, food or fluids are swallowed slowly and with difficulty, the voice becomes feeble and the speech inarticulate.

Muscular tremor is invariably present, and sometimes *tonic spasm* affects a certain group of muscles.

RESPIRATORY SYSTEM.—Pulmonary complications are very common in typhus. *Bronchitis* occurs to some extent in almost every case.

Pneumonic and Hypostatic congestions are also very common, the former occurring in the earlier stages of the disease, the latter towards its crisis. These conditions are indicated by urgent breathing, and lividity of the lips and countenance. Pain is rarely complained of, and the cough and expectoration are not in proportion to the amount of pulmonary disease. There is in fact diminished excitability of the excito-motory nerves of the lungs. Rapidity of breathing, a little wheezing with a slight cough, and occasional expectoration of colourless, frothy, or russet and viscid sputum are sufficient indications of pulmonary

mischiefs, and, on examining the chest, we may detect pretty general mucous rhonchus and crepitation. Crepitation is commonly to be heard at the back of the chest. Congestion is indicated by dulness and bronchophony over the part.

Pleurisy occasionally supervenes in a still more insidious manner, the effusion being fluid in most cases; in others acute pain and the usual physical symptoms of the disease are present.

GLANDULAR SYSTEM.—*Affections of the Liver.*—Jaundice is a very rare complication. Dr. Jenner never met with an instance; Professor Frerichs and Dr. Murchison have each observed two cases. I have met with one. It is a severe complication, and the patients usually die; my own patient, a powerfully made, muscular, young man, had a narrow escape. The typhus rash was very copious; there was intense prostration and continued stupor for 9 days. He rallied about the 19th day, and during this time he became most rapidly and completely emaciated. (J. H.)

Affections of the Kidneys.—In typhus the quantity of urine is diminished, colour reddish-brown, specific gravity high, the quantity of urea is considerably increased, uric acid is also increased. The chlorides gradually diminish, and are at last reduced to a mere trace. Dr. Buchanan gave a patient $1\frac{1}{2}$ ounces of chloride of sodium, but not a trace could be detected in the urine afterwards. Albumen is found in about half the cases; it commonly appears after the 7th day of the disease. Both Frerichs and Murchison detected leucine and tyrosine in cases in which jaundice was a complication. Occasionally, suppression of urine occurs, and the patient dies comatose, with or without convulsions.

The Skin and Integument.—Several secondary diseases affect these parts in typhus fever. 1. *Sudamina* is of common occurrence in some epidemics. The eruption is generally found on the chest, neck, and arm-pits. 2. *Boils* sometimes appear during convalescence. 3. *Erysipelas* is apt to occur when prevalent. 4. *Gangrene* and *sloughing* of the integuments, preceded by erythema of the skin, are common occurrences in the advanced stage of the disease, in parts submitted to pressure, and large bedsores are often formed over the sacrum and trochanters.

Inflammations of the parotid, axillary, and cervical glands, rapidly running on to suppuration, are amongst the most severe complications of the disease. These affections often appear about the time of convalescence, and if they do not prevent its establishment, they very much retard it, for the surrounding integument becomes indurated, and the sloughy cellular tissue in which the glands were imbedded, separates very slowly. Buboes in the arm-pits and groins, and carbuncles, are of rare occurrence. Phlegmasia dolens is a rare sequel.

STAGES.—1. *The period of Incubation, or latent stage*, variable, average duration about ten days. 2. *The stage of Invasion*, extending from commencement of illness to the appearance of the rash, from four to seven days. 3. *The stage of nervous irritation* extends from end of last stage until somnolency comes on, a period of three or four days; during this period the patient is restless, wakeful, and delirious. 4. *The*

typhous stage. This is the last stage of many other diseases, as it is of typhus, and is commonly called the "typhoid" stage. We abandon this term because it designates a particular fever, and use the word typhous in place of it. The typhous stage is characterised by dorsal decubitus—a rapid thready pulse; muttering delirium, stupor, or imperfect coma; a dull fixed eye; an open mouth displaying a hard, dry, and brown tongue, and sordid lips and teeth, and exhaling an offensive odour. The evacuations are passed involuntarily, and the hands exhibit convulsive movements. 5. *The Convalescent stage.* A month is usually sufficient to restore the patient to his original health; falling of the hair is common, but no permanent derangement of the functions remains.

Duration, varies according to the severity of the attack, and the strength and age of the patient: convalescence most frequently commences on the fourteenth day. It is occasionally postponed to the twenty-first, but in mild cases it may be initiated at the end of the first week.

Prognosis.—*Favourable*, if the patient be young, well nourished, and of a non-excitabile temperament, if the pulse maintain moderate bulk, and do not exceed 120, and there be no tendency to pulmonary complication. *Unfavourable*, if the patient be beyond sixty, and feeble, if the pulse be weak and intermittent, or if it much exceed 120, if the rash rapidly become petechial, if pulmonary complications make an early appearance.

Mortality.—Out of 4,787 admissions into the London Fever Hospital, 1000 = 20·89 per cent. = 1 in 4·78, died. Deducting those cases which were fatal 24 hours after admission, the mortality falls to 19·56 per cent. It is greater in males than in females.

PATHOLOGY.—*The blood* is very dark and fluid; if we do meet with coagula, they are soft and friable. If pneumonia have existed, firm yellowish clots are found in the right side of the heart. Taken during life the blood is found to be deficient in fibrine, urea may often be detected in the serum, and ammonia is present in appreciable quantity. *The Bile* is dark and thick, like treacle. I have observed its specific gravity as high as 1050. With water, it forms a golden-yellow feebly alkaline solution which possesses the reactions of healthy bile. On evaporation it yields a large quantity of glistening and brittle black residue, smelling strongly of fatty matter. (J. H.)

The Muscles, including the heart, are dark and easily lacerated.

The Brain and nerve tissue are firm and healthy, but the cerebral membranes are commonly gorged with blood. Passive effusion of serum between the membranes and into the ventricles is one of the usual results of typhus; inflammatory exudations are exceedingly rare. In one patient, a woman, aged 45, in whom head symptoms were very severe, and accompanied during the last four days of life by occasional convulsions, I found the convolutions flattened, much jelly-like serum beneath the arachnoid, and a few small patches of coagulated fibrine on the upper surface of the pia mater; some shreds of coagulated lymph were also found in the lateral ventricles; the theca vertebralis contained much serum. (J. H.)

The *Kidneys* are frequently found severely congested.

The *alimentary canal* is everywhere healthy, or at most only congested in its most vascular portions. The *liver and spleen* are more or less congested and softened.

Effusions into the serous cavities are common.

The *respiratory organs* show various lesions. The mucous membrane of the respiratory tract is injected and soft; the lungs may be œdematous, engorged, or partly consolidated. The air-tubes are commonly filled with frothy fluid.

GEOGRAPHICAL DISTRIBUTION.—Typhus is common to every country of Europe, and is therefore so far independent of climate. Italy, Spain, and Great Britain appear to have suffered most from its ravages. Ireland, in particular, has been so little free from the disease that it would appear to be endemic there. It is prevalent in Canada and the United States. We have no evidence of its existence in Australia and New Zealand. Of its existence in South America, in Asia, and in Africa, we want positive proof, fevers of all kinds having been much confused in these parts of the globe. It has often been conjectured that the plague is the typhus of tropical countries.

CAUSES.—1. *Predisposing*—*depression of the vital power* from mental or bodily exhaustion; hence the disease most commonly attacks those of adult age. *Season and Temperature*: Typhus appears to prevail, *cæteris paribus*, irrespective of these conditions. *Overcrowding with imperfect ventilation and insufficiency of food* are both very powerful predisposing causes. Even in London typhus is rare amongst the middle and upper classes. The severest epidemics have appeared in times of scarcity.

2. *Exciting*: a specific poison generated within the bodies of persons suffering from prolonged want of sufficient food, and, at the same time, exposed to animal exhalations. *Infection* by the poison so generated. No fever is so positively infectious as typhus. It spreads quickly through a family: nurses and medical attendants, if they do not use sufficient precaution, invariably take the disease directly from those suffering from it. The poison is contained in the cutaneous and pulmonary exhalations of the patient, and is no doubt introduced into the system of another person through the lungs. It is doubtful whether typhus can be conveyed, like scarlatina, by mere contact; and it is almost certain that it cannot be communicated from one person to another by the clothes of a non-infected person.

DIAGNOSIS.—Extreme muscular prostration, with general dull aching pains, a weak pulse, dusky complexion, dulness of the senses and intellect, heavy persistent headache, a peculiar dusky eruption, and a bad odour of the body, are the marks of typhus. Excepting the rash however, which does not appear until the fourth or fifth day, these are not very positive symptoms. and there may be much doubt as to the true nature of the disease during its early stages, when it may be confused with enteric and relapsing fevers, measles, phrenitis, suppression of urine, and with some other diseases, such as pneumonia and pyæmia.

which sometimes, in the absence of their more obvious symptoms, rapidly assume the typhous condition.

Enteric and relapsing fevers are distinguished in the account of these diseases.

Rubeola usually attacks children, and is accompanied by coryza and catarrh. There is no unusual prostration of the strength in this disease, and the rash is peculiarly patchy, and of a much brighter colour than in typhus. The symptoms of *phrenitis* are ushered in by great irritability of temper, the senses are painfully acute, so that light and sound are intolerable, the eyes are bright and wild. Strabismus is a common symptom: there is often sympathetic vomiting; there is no rash. If *meningitis* be present, we have superadded to the symptoms of *phrenitis* those of acute mania; the pain in the head becomes intolerable.

Low forms of inflammation of the brain are distinguished with great difficulty. The history of the case, and the absence of much fever and rash, will serve to guide us.

Uræmia is characterised by the sudden accession of stupor rapidly passing into coma. Convulsions, which are rare in typhus, are generally present in this disease.

Pneumonia.—General pneumonic engorgement of asthenic form is still more difficult to distinguish from typhus; indeed, it is not improbable that the typhus poison, in common with other animal poisons, may produce that rapid engorgement of the lungs and depression of the vital power which is occasionally met with, death occurring in such cases before specific symptoms of the fever have had time to declare themselves. (J. H.)

PROPHYLAXIS AND DISINFECTION.—Avoid the exhalations from the patient; dilute and carry them away by direct and free ventilation; distribute about the room lumps of wood charcoal; expose all articles of clothing infected with the disease to the action of boiling water, or to steam, and subsequently rinse them in water containing permanganate of potash in the proportion of one ounce of a saturated solution to a gallon of water. Mattresses should be well baked in an oven.

TREATMENT.—The patient should be placed in a cool, well-ventilated room, in which a brisk fire is constantly burning. A nurse should be in constant attendance. If the skin be pungently hot, immersion for five minutes in a hot bath should be resorted to; if the heat of skin be milder, tepid sponging will prove of service.

The heat of the head may be allayed by iced water, poured in a small continuous stream from a height for the space of ten or fifteen minutes. The head should be shaved whenever the brain symptoms are severe, and if the headache be not relieved by the cold douche, blisters should be freely applied to the forehead, or to the whole of the scalp. The bowels should be kept in free action by the help of cholagogue purgatives. Sleeplessness, nervous excitement, and delirium must be combated by hypnotics. Opium is the remedy: it should be given in moderate doses at first, such as 15 drops of tincture, or five grains of compound

soap pill; but if this fail to fulfil the object the dose may be doubled or trebled. Dr. Graves recommended that the opium should be given in combination with from $\frac{1}{24}$ to $\frac{1}{12}$ of a grain of tartar emetic, and Dr. Murchison approves of this combination, the theory being that the antimony assists the operation of the opium. We must not, however, give many doses of the antimonial, or else its depressing action will be felt.

But the indication for treatment of all others is to support the failing strength. The constant attention of good nursing is indispensable for this; the means are diet and medicine. In the early stages of the disease food is generally taken well, but the general condition of the digestive organs is unfit for the solution of solid food. The diet should consist of eggs, milk, beef-tea; three or four eggs may be given daily: they should be given with tea or coffee in the form of emulsion. Tea and coffee are themselves good articles of diet in typhus, since it has been shown pretty conclusively that they diminish that wasting of the tissues which takes place to such a great extent in this disease. Alcoholic stimulants are invaluable in typhus, and may be administered throughout the disease. In their exhibition we must be guided by the state of the pulse. If the pulse be of fair volume and under 90, $\mathfrak{z}\text{vii}$ may be given in the twenty-four hours. If above 90 and under 120, $\mathfrak{z}\text{xij}$ to $\mathfrak{z}\text{xvi}$ may be administered. If above 120, the stimulant may be administered without restriction. Brandy is the best kind of stimulant; it may be given quite irrespective of delirium; it should be mixed with iced water, and given every one or two hours.

The purely medicinal treatment should be directed with a view to the stimulation of the nervous force. Ammonia is the most valuable diffusible stimulant that we possess. It may be given in the form of the sesquicarbonate, either in iii-v grain doses or $\mathfrak{z}\text{ss}-\mathfrak{z}\text{j}$ of sal-volatile, combined with $\mathfrak{z}\text{j}$ of decoction of ciuchona, and the dose repeated every four hours.

Quinine and acid is not always well assimilated during the prevalence of the fever, but after the crisis such a combination is of much service.

Strict attention must be paid to the state of the bladder, especially in the later stages of the disease when the patient becomes apathetic and the muscular tissues fail in contractile power. If the urine accumulate in the bladder, it must be drawn off twice a day. If the quantity be much diminished we must resort to brisk hydragogue purgatives, and apply mustard poultices to the loins.

We must carefully examine, from day to day, the state of the integuments over the sacrum and trochanters; and as often ascertain the temperature of the feet. Bedsores and mortification of the toes are great complications which, in nineteen cases out of twenty, may be prevented by proper vigilance on the part of the medical attendants.

The breathing must be carefully noticed. If the inspirations exceed twenty-five per minute, we must examine the chest. If pleuritis or pneumonia be present, blisters will be necessary. If there be cough and wheezing, with hurried breathing and mucous crepitation in the lungs, mustard poultices and turpentine stupes may be advantageously applied to the chest, and five grains of sesquicarbonate of ammonia, with

fifteen minims of tincture of squill, in an ounce of decoction of senega, given every four hours.

If inflammatory swelling of the parotid arise, we must endeavour to prevent suppuration by the usual means. Half a dozen leeches may be applied. As this is a complication which supervenes about the time of convalescence, we may generally exhibit quinine freely. The quantity of alcoholic stimulant should at the same time be increased, and the diet should be as full and nutritious as possible. As soon as fluctuation is detected, the pus should be let out by free incision.

ENTERIC FEVER.

SYNONYMS.—Typhoid, pythogenic, gastric, intestinal, bilious continued, and cesspool fevers; muco-enteritis.

DEFINITION.—An endemic contagious fever, generated by decomposing animal matter.

SYMPTOMS.—The disease generally makes its appearance very insidiously. There are no marked premouitory symptoms: chilliness, loss of appetite, and slight pyrexia—sometimes accompanied by nausea and a little diarrhœa, and sometimes not—mark the outset of the disease in most cases. In others, vomiting and diarrhœa, with some abdominal tenderness, are the earliest indications of the disease. On careful examination some evidence of gastro-intestinal irritation will always be found. The tongue is furred and red at the tip and edges, and often aphthous; the pulse is small, frequent, and sharp; the face is pale and somewhat pinched, and the cheeks are often flushed with a circumscribed blush; tenderness will generally be complained of on pressing the abdomen. The patient becomes weak, the skin is hot and dry, the lips cracked. There is complete anorexia and much thirst. In this condition the patient generally comes, for the first time, under the notice of the medical practitioner, and states that he has been feeling unwell for about a week.

On the *seventh day*, or a little later, a few round, well-defined rose-coloured spots make their appearance upon the abdomen, chest, and back of the patient. These spots closely resemble the papulæ of variola during the first few hours of their existence, but they are not quite so large, nor so hard. They are elevated and prominent, and disappear on pressure. The number varies considerably: in most cases they are very few, and may easily be overlooked. At this stage of the disease we shall rarely observe more than half a dozen over the whole of the chest and abdomen, and very often not more than three. In some cases there is no eruption. The quantity of the rash bears no proportion to the severity of the disease. Forty-eight hours after their appearance the spots begin to fade and new ones arise, which in like manner disappear, and are succeeded by another crop. If the disease be protracted, there may be a constant succession and recession of the rash throughout its course. At this stage the abdomen will usually be found more or less

tympapanic and tender, the tenderest part being the right iliac fossa, where pressure commonly produces gurgling. If the bowels have not yet been relaxed, diarrhœa now sets in with greater or less severity. The stools are watery, and of a light yellow colour; the tongue is covered with dirty white fur, and is cracked and apthous. If the purging continue, it becomes dry, brown, and contracted, or red and glazed; it is usually more or less fissured, and it is often covered with large patches of superficial ulceration. The teeth are crusted with sordes; the pulse ranges between 90 and 120; the skin and head are hot, and there may be much delirium; the cheeks are dyed with a hectic blush. During the second week of the disease, and afterwards, hæmorrhage from the bowels may occur. The patient may become suddenly blanched and die, without the discharge of blood per anum, and in such a case the intestines will be found distended with blood. In other cases the hæmorrhage recurs at intervals, and the patient becomes pallid and much prostrated. Hæmorrhage, however, is not the only danger we have to anticipate. The patient is often cut off by perforation of the intestine. This dreaded result may be expected if the purging be frequent and persistent, if the tenderness and tympanitis increase, and if vomiting and hiccup supervene. Perforation is most commonly preceded by symptoms of general peritonitis, accompanied by excessive tympanitis and persistent hiccup and vomiting. A paroxysm of more intense abdominal pain may indicate that perforation has taken place, or previous to such a complication the patient may sink and die.

The patient may be conscious and acutely sensible of his condition throughout the disease to within an hour or two of his death; but when the diarrhœa is very exhausting and protracted the patient usually falls into a state of apathy, and manifests a little delirium at night. He lies motionless in bed, and is now liable to bedsores. Emaciation recurs very rapidly, and if no amendment take place the typhous condition becomes established, the tongue and teeth become blackened with sordes; stupor, with convulsive twitchings, delirium, and coma, succeed each other; the watery motions are passed involuntarily, and the patient gradually sinks.

If the disease terminate favourably the improvement is generally very slow, the daily number of the stools gradually diminish, and they become more and more solid; no fresh spots appear; the temperature of the skin falls, and perspiration appears; the tongue begins to clean, and the appetite slowly returns.

Such are the usual symptoms of the disease. They often vary considerably. Profuse diarrhœa, with vomiting, may be amongst the earliest symptoms. In some cases the bowels are constipated throughout the disease. In the very mildest cases the severest complications may at any time supervene. In other cases there is noisy delirium from the commencement of the disease.

Convalescence is occasionally interrupted by a relapse, a crop of fresh spots appear, and diarrhœa again sets in, to be followed perhaps by more urgent symptoms. The relapse may generally be traced to some error of diet.

The average duration of the disease is above four weeks: it is rarely terminated in three weeks. If the attack have been severe, convalescence will be very much protracted, and the patient will not be safe for many weeks.

COMPLICATIONS AND SEQUELÆ.—Diseases of the respiratory organs—bronchitis, pleurisy, and pneumonia—are frequent complications of enteric fever. *Laryngitis*, with croupous exsudations, and ulceration, is not uncommon. In one of my patients (a young man who was convalescing from a severe attack of the fever) suffocation impended for two days, and was ultimately relieved by the ejection of fragments of a tough membrane. In this case ulceration was evident, and aphonia persisted for several weeks. (J. H.)

Abortion and phlegmasia dolens are liable to occur during an attack of enteric fever.

Peritonitis, perforation, and hæmorrhage occur as the natural results of the progress of the disease. If the ulcers of the intestine erode a small artery, hæmorrhage occurs to a lesser or greater extent. If the progress of the ulceration be not checked the ulcers extend through the mucous, areolar, and muscular coats, and reach the peritoneal covering. As soon as this is effected local peritoneal inflammation is set up; and as this rapidly spreads from these several points, the peritonitis may become general.

Perforation, I believe, is rarer than is generally supposed. The deepest part of the ulcer often, indeed, lies on the attenuated peritoneum, which here and there presents a sloughy point; but the slough is pretty firmly adherent, and retained in its position by solid effusion on the intensely-inflamed serous surface. When perforation occurs the peritoneal coat becomes excessively thin, and gives way in one or more places. The apertures are generally small and rounded.

Inflammation and suppuration of the parotid sometimes occurs, but much more rarely than in typhus.

Marasmus is almost a necessary result of a severe form of the disease, since the mesenteric glands, as well as the solitary and agminated glands of the intestine, are so directly and extensively involved in the disease.

PATHOLOGY.—Whatever be the ultimate cause of enteric fever it essentially manifests itself in derangement of function, and in lesion of structure of the alimentary canal. The lips are cracked; the tongue fissured, and often covered with ragged aphthous ulcers; the pharynx and œsophagus occasionally present the same lesions if the disease be protracted beyond the third week. The stomach and duodenum, however, are unaffected, and the disease chiefly, in many cases exclusively, falls upon that portion of the alimentary canal in which the solitary and agminated glands are distributed, viz., the lower part of the small and the large intestines. But it is upon the solitary and agminated glands (Peyer's patches) of the *lower third of the ileum* that the disease expends its virulence. There we invariably find disease after death from enteric

fever. In the early stage of the disease (on the fifth or sixth day) these normally obscure glands are swollen and prominently elevated above the surrounding mucous membrane; they are pale, rounded at the margin, and soft. Next they become vascular; the blood-vessels of the surrounding mucous membrane are seen converging towards their centres; and the corresponding part of the peritoneum presents a vascular patch of dilated vessels. The enlargement and vascularity increase, and the swollen gland becomes softened and abraded; and this first stage of degeneration is quickly succeeded by sloughing or ulceration. Sometimes a whole Peyer's patch is covered with a discoloured aphthous-looking slough. When the slough has separated, or the ulcer advanced, the surface exhibits a rugged, granular appearance, being formed of angry-looking granulations, of various sizes, enclosed in an irregular network of sloughy areolar tissue. The edges of the ulcer are hard and elevated; externally they are rounded and smooth, internally they are ragged with excavations. In proportion as the base of the ulcer nears the peritoneum, so does that membrane increase in inflammation; and if the ulcers be numerous the inflamed patches become confluent, and the outer surface presents the appearance of intense inflammation, and may be covered with plastic lymph. If the ulceration implicate this covering, as it often does, perforation sooner or later must result. The event, however, is often retarded for a time by the adhesion of a little sloughy tissue within the membrane itself, or by the deposition of solid lymph upon its outer surface. The aperture formed in the peritoneum rarely exceeds three lines.

The ulcers are in proportion to the number of the glands, or size of the patch affected: if a single gland, or only two or three, the ulcer is a small spot; if a Peyer's patch, then there will be a rounded or oval ulcer, varying in size from a quarter of an inch to an inch and a half. The ulcers are sometimes confluent.

On recovery from the attack the ulcers heal, cicatrize, contract, and ultimately form a smooth, depressed surface, thinner and less vascular than the surrounding healthy coat.

When the *large intestine* is implicated, the disease is usually confined to the cæcum and the ascending colon. The cæcum is often severely affected. The ulcers in this part of the alimentary canal are small, round, and uniform in size, unless they become confluent.

The mesenteric glands show their sympathy, if not their identity in anatomical structure and function, with the solitary and agminated glands, in being invariably swollen to several times their natural size, and more or less inflamed. The inflammation may go on to suppuration.

The affection of the glands within and without the alimentary canal consists in a deposit of opaque yellowish matter within their interior.

The spleen is enlarged and softened. It is darker coloured, and sometimes contains little masses of yellowish-white deposit, resembling that found in the diseased intestinal glands.

The liver presents no apparent lesion. The mucous membrane of the *gall-bladder* is frequently found inflamed, but rarely ulcerated.

The bile is thin, almost colourless. In one case, which I examined twelve hours after death, it smelt strongly of sulphide of hydrogen, was neutral to test paper, of a light greenish-brown colour, had a specific gravity of 1011·2, and gave the ordinary reactions with the mineral acids. It yielded but a small proportion of solid matter, which by transmitted light had the greenish-brown colour of Cape aloes. (J. H.)

GEOGRAPHICAL DISTRIBUTION.—Enteric fever prevails generally over all the world. It appears to occur more frequently in England than in any other country.

CAUSES.—1. Predisposing. *Youth.*—The mean age of 1772 cases admitted into the London Fever Hospital during ten years was 21. Of these half were between 15 and 25 years of age, one-fifth were under 15, less than one-seventh were above 30, and less than one-sixtieth exceeded 50.

Season.—Enteric fever is an autumnal disease. It may and does prevail during winter, spring, and summer; but it is much more prevalent in autumn. It is more prevalent in dry and hot than in cold and wet seasons. *Station in life.*—The poor are perhaps more exempt from the disease than the other classes.

2. Exciting.—*Exhalations from putrid decay of animal matter.* The instances on record which prove this point are very numerous. The following are cited in Dr. Murchison's work on the Continued Fevers of Great Britain. I. Twenty out of twenty-two boys, at a certain school, were seized with fever, accompanied by symptoms of severe gastro-intestinal irritation. Two of the fatal cases were examined, and the usual lesions of Peyer's patches, and the solitary and mesenteric glands were discovered. The cause was attributed to the opening, two days before the first case of illness, of a drain at the back of the house, which had been choked up for many years, and the distribution of its offensive contents over a garden adjoining the boys' playground.

II. In the year 1838 an epidemic of enteric fever desolated a commune in the department of Ariège. Nearly half of the inhabitants were attacked, and nearly a third of these died. The cause of the epidemic was traced to a stagnant pool, which was the receptacle of dead animals and of all the sewage of the district. Three times the pestilence returned, and each time when the wind was blowing over the infected water.

III. All the residents, fifteen in number, of a farmhouse in Peebles were seized with a fever, accompanied by so much gastro-intestinal disturbance that suspicions of poisoning were entertained. Three died. The only explanation of the outbreak was that all the drains and sewers were found closed-up and obstructed with the accumulated filth of the privies and farmyard.

In these cases the poison was doubtless conveyed by the air. In the following case it appears to have been introduced into the system by water:—

IV. The inhabitants of thirteen out of thirty-four houses of a certain crescent derived their drinking water from a well at one end of the cres-

cent; the remaining houses were supplied with water from another source. At the end of September it was evident that the water from the pump was tainted with sewage. Early in October intestinal fever broke out almost simultaneously in all the thirteen houses using the water.

Some observers, however, attribute the disease to a *specific poison*, contained within the alvine excretions of persons suffering from the disease, and deny that it may be spontaneously generated by putrid animal matter. Observed facts and the few experiments which have been made tend, however, to disprove these views.

Contagion and infection.—Much doubt prevails whether enteric fever be infectious or not; and the question really turns upon the existence of a distinct specific poison. Positive proof that it may be conveyed from one person to another is wanting, and certainly the majority of people affected with the disease directly derive it, upon the clearest evidence, from one and the same source. Those in attendance upon persons suffering from enteric fever do sometimes fall ill of the disease. It is, indeed, a rare sequence, but it has happened in cases where the nurse has never been exposed to those external conditions which were the assumed cause of the disease in the patient; and hence the majority of physicians incline to the opinion that the disease is contagious, but only in a slight degree.

DIAGNOSIS.—In the early stage, enteric fever may be mistaken for *typhus*, *relapsing fever*, and *variola*. The difference between typhus and enteric fever have reference—1. to the general phenomena of the two diseases. Great muscular prostration and early cerebral disturbance, with depression of the senses and mental faculties, mark the onset of typhus; while symptoms, more or less obscure, of gastro-intestinal disturbance indicate the presence of enteric fever; but sickness and diarrhoea may be absent in enteric fever, and head symptoms may be prominent from the first in this disease. 2. *Abdominal tenderness* about the umbilicus and right iliac fossa, and, 3. *a moist, thickly-furred aphthous tongue*, may inform us that the disease is enteric, and not typhus fever. 4. Light ochre-coloured fluid stools are diagnostic of enteric fever. 5. When the eruption appears the diagnosis becomes certain. In typhus the rash appears about the fourth day; in enteric on the seventh, or a few days later. In typhus it consists of a diffused dusky mottling composed of irregular, uncircumscribed non- or barely elevated spots, tending to fade into dirty discoloration, or to become distinct petechiæ. In enteric fever the rash appears much later, it never gives a mottled appearance to the skin, and it is never confluent. The constituent spots are rose-coloured, circumscribed, isolated, and elevated, so as to be distinctly recognised by the finger; they always disappear on pressure and never become petechial. The only difficulty in diagnosis by the skin is that the freckled or mottled skin often seen in dark complexions, or when certain faint syphilitic maculæ are present, may so mislead us that we may fail to observe the three or four minute pink papulæ which indicate the presence of enteric fever.

6. *The progress and duration of the disease.*—The dusky blush suffusing the head and neck in typhus, contrasts with the circumscribed hectic flush and pinched features of enteric fever. The one disease tends to death by coma, the other to death by asthenia; typhus kills or shows signs of departure in the second week, enteric fever continues for three or four weeks.

Variola.—If the lumbar pain be absent in the accession of this disease and the eruption make its first appearance as a few isolated papules upon the chest and abdomen, the case may be doubtful for a day. Such a case occurred in my practice a short time ago. A student of the college had been feeling poorly for a week before I saw him, when he was in a state of high fever, complaining of headache and great and persistent nausea, but there was no vomiting nor lumbar pain; he presented a large but faint vaccine scar; the tongue was coated with a dirty-white fur, the abdomen was painful on pressure, and there was a distinct gurgling in the right iliac fossa, resulting, no doubt, from free action of the bowels induced by a purgative previously administered. Next day the tongue was dry and brown, and seven elevated rose-coloured papulæ, completely resembling those of enteric fever, were scattered over the abdomen and chest. There was no trace of eruption, or of that roughness of the skin which precedes it, on the face or any other part of the body. In this stage it was impossible to decide whether the case was one of small-pox or enteric fever, and I suspended my diagnosis for a while. A few hours, however, were sufficient to decide the matter; after a copious sweat the existing papules became harder and more prominent, and others began to appear on the face and limbs. It was a case of discrete variola. (J. H.)

Chronic Tubercular Peritonitis presents many of the symptoms of enteric fever. The hectic flush, pinched features, abdominal pain, tenderness and gurgling, anorexia and diarrhœa, are all present in this disease, but the tongue is usually moist and clean, there is no eruption, and frequently the abdomen is distended with effusion; moreover, there may be evidence of tubercular deposit in the lungs.

PROPHYLAXIS AND DISINFECTION.—Whenever a case of enteric fever occurs in a given locality, we must examine into the condition of the drains and the nature of the drinking water, and ascertain whether there be an offensive accumulation of decomposing animal matter in the neighbourhood of the house. If it can be done speedily and without temporarily increasing the nuisance, drains should be cleared and flushed, and offensive accumulations removed. In the absence of all other water, that which is contaminated must be filtered through charcoal and boiled before it is used; but whenever it is practicable the patient should be removed to a healthy locality. The dejections of patients suffering from the disease should be mixed with solutions of permanganate of potash, of chloride of zinc or lime, or with a small quantity of hydrochloric acid, and be speedily removed.

Bad odours when perceived in a house should be traced at once to their source and the cause removed, or their diffusion prevented by the sub-

stitution of stench-traps for open grating. A sufficient fall for the sewage should be provided, and in seasons of drought the drains should be occasionally flushed.

Pipes connecting the waterclosets with the drain or sewer should be constructed of iron, and always placed on the *outside* of the wall of the house. If made of lead (which is readily eroded by rats) and carried down the *inside* of the house, an apartment is at any time liable to be filled with foul air derived directly from the sewer.

Whenever it is necessary to open a drain, or to empty cesspools, disinfectants should be freely used, and the air thoroughly and constantly impregnated with free chlorine. Fresh mould, lime, soot, and solution of chloride of zinc should be mixed occasionally with the offensive matter, and the chlorine may be evolved from a mixture composed of $\mathfrak{z}\text{iv}$ each of finely powdered black oxide of manganese and common salt, and $\mathfrak{z}\text{viii}$ of sulphuric acid diluted with a little water, placed in a deep dish.

TREATMENT.—In the present state of our knowledge enteric fever must be treated as a purely local disease. We presume ulceration of the intestines, and we fear its worst results. We know of no means of preventing the deposition of morbid material in the glandulæ connected with the intestinal canal, and when the patient comes under our notice it is generally too late to adopt an eliminative plan of treatment with the view of preventing further deposit and of removing that already formed. If, however, we see the case sufficiently early and have grounds enough to form a diagnosis, it would be well to prescribe two or three grain doses of iodide of potassium in combination with 10 or 15 grains of bicarbonate of soda or potash.

The liver would appear to be early at fault, and in the premonitory stage of the disease, mild hydragogue purgatives in combination with the alkaline treatment, may be of service.

The diet must be most carefully regulated: solid food of all kinds must be avoided; eggs and milk and arrowroot in various combinations should form the staple articles of food. The eggs should be lightly boiled, or given in emulsion with coffee or tea. Beef-tea may be frequently given; a few ounces of red wine may be allowed from the first and increased to a pint or more during the progress of the disease if the failing strength require it.

If the bowels be constipated, $\mathfrak{z}\text{ss}$ of castor oil in combination with 10 drops of tincture of opium may be given. Sickness is best combated by iced soda-water to which a few drops of hydrocyanic acid have been added. If there be much abdominal tenderness half a dozen leeches may be applied to the right iliac region, or around the margin of the anus. If the pain and tenderness be slight, hot fomentations, mustard poultices, or turpentine stupes, applied to the abdomen, may be sufficient. The diarrhœa must be checked: $\mathfrak{ss}$ of chalk mixture with v drops of tincture of opium, or i-ii grains of acetate of lead with a few drops of acetic acid in an ounce of cinnamon water, or $\frac{1}{2}$ grain of sulphate of copper combined with i or ii grains of compound soap pill, may be given

with this view. Moderate doses of opium alone are sometimes sufficient. If it continue unchecked by these remedies we must use in addition an enema once or twice a day, composed of $\mathfrak{z}\text{ij}$ of starch water and xv drops of tincture of opium. If hæmorrhage occur it will be necessary to increase the dose of the astringent, or we may substitute for the lead and copper salts, v grain doses of gallic acid; cold fluids should be given, and a bladder of ice placed over the right iliac fossa. Turpentine in x or xx minim doses is a valuable remedy in hæmorrhage, and it is also useful in relieving the tympanitis that often accompanies it. Assafoetida enemata are also useful in tympanitis, which is sometimes very great, and while it causes severe pain, it at the same time places the life of the patient in great jeopardy, laceration of the diseased and attenuated coat of the intestine being in this distended condition very imminent.

If peritonitis, with or without perforation, supervene, we must exhibit opium very freely; i or ii grains of the powder may be given every two or three hours; hot fomentations, or a large blister, may be applied to the abdomen. Hiccup is often a most painful complication of this condition; the inhalation of chloroform is the readiest means of relieving it.

In the absence of very severe symptoms, small doses ($\frac{1}{2}$ grain) of quinine in combination with xv drops of dilute sulphuric acid, and an ounce of decoction of cinchona, may be given twice or thrice a day throughout the disease.

Head symptoms and pulmonary complications require such treatment as is recommended in typhus fever.

During convalescence we must patiently pursue the same plan of treatment as regards diet and tonic astringent medicines. As the appetite improves and the stools become less frequent, darker and more solid, we may increase the quantity of food, and substitute another egg and a little fish in place of beef-tea, but on no account must solid meat or vegetables be taken for full a fortnight after the stools have become solid. An egg boiled moderately hard will sometimes be sufficient to produce a recurrence of diarrhœa and bring on a relapse. Cod liver oil is useful, when the stomach bears it, in removing the emaciation resulting from the disease.

RELAPSING OR FAMINE FEVER.

SYNONYMS.—Five or seven days' fever. Epidemic remittent fever. Bilious relapsing fever. Famine fever.

DEFINITION.—A contagious fever, of from three to seven days' duration, abruptly terminating, and recurring after complete apyretic intervals of about a week.

SYMPTOMS.—Sudden and severe rigors, coming on without premonitory symptoms, and when the person is engaged in his ordinary occupations; severe headache and muscular pains speedily follow. After an hour or two, intense febrile symptoms appear, with a full,

bounding pulse; a dry, burning skin; the tongue is coated with a white fur; there is severe pain in the epigastrium and vomiting of bilious fluid or of black, coffee-ground matters. The bowels are constipated and the urine scanty and high coloured. On the third, fourth, or fifth day jaundice occurs in 20 per cent. of the cases. The stools are dark or even black, and melæna is sometimes noticed. The headache assumes a throbbing character; the intellect remains quite clear; but there is constant watchfulness and great restlessness.

At the end of five or six days, sometimes earlier and sometimes later, the patient breaks out into a most profuse perspiration, often accompanied by diarrhœa, and sometimes by intestinal or uterine hæmorrhage: the febrile symptoms are thus brought to an abrupt termination, and the patient feels perfectly well, eats, drinks, and goes about as usual. After a week, or more rarely a fortnight, he suddenly relapses into his former febrile condition. This second attack may be less or more severe than the first: in the latter case severe jaundice and delirium may be present. After usually three days, a second intermission occurs, and the patient is restored again for a time to comparative health, complaining only of a little languor. A second or third relapse, coming on at intervals of a week, may occur; but in some cases the patient recovers without a single relapse. Occasionally sudden collapse takes place, the patient becomes cold, livid, and comatose, and dies a few hours after the accession of the disease.

COMPLICATIONS AND CONSEQUENCES.—*Diarrhœa* often appears at the crisis of the disease: in some cases it is slight, and readily controlled; in others it is restrained with difficulty, and is attended with considerable griping and tenesmus. Occasionally severe *dysenteric symptoms* persist, and cause death. *Chronic inflammation of the mucous membrane of the pharynx and trachea* is an occasional consequence of relapsing fever. *Menorrhagia and abortion* are frequent complications in the female sex.

MORTALITY.—Relapsing fever is not a very fatal disease. Of 441 cases admitted into the London Fever Hospital, only 11 = $2\frac{1}{2}$ per cent. were fatal. The mortality, however, appears to vary, being greater in some epidemics than in others. In the Scotch epidemic of 1843 the mortality was as high as 4 per cent.

PROGNOSIS.—*Favourable*, if the patient be young and vigorous, and if there be no tendency to complications. *Less favourable*, if the middle age has been passed, if much jaundice be present, and persistent diarrhœa supervene. *Unfavourable*, if we have reason to anticipate suppression of urine.

PATHOLOGY.—No specific lesions of structure are found in this disease. The tissues are usually more or less jaundiced. If gastrointestinal symptoms have been present, patches of ecchymosed mucous membrane may be found in any part of the alimentary canal. The lower part of the *ileum* in particular is usually greatly congested; but neither Peyer's patches nor the mesenteric glands indicate the slightest

morbid condition. The *liver* is congested, the gall-bladder and ducts are healthy; but the bile is dark and very thick. The disease chiefly affects the *spleen*, which is greatly enlarged, engorged, and soft. The *blood* is said to contain an unusual number of white corpuscles. The *kidneys* are commonly congested.

GEOGRAPHICAL DISTRIBUTION.—Relapsing fever, like typhus, appears to be more prevalent in Britain and Ireland than elsewhere. Ireland is its favourite habitat, and it has oftener prevailed in Scotland than in England. On the Continent it has been observed amongst the inhabitants of Silesia, and in 1855 it affected our troops in the Crimea. It has been observed in several parts of North America. It is unknown in tropical countries.

CAUSES.—1. *Predisposing.* *Recent residence in London* appears to predispose to relapsing fever. "Of 380 cases admitted into the London Fever Hospital, in which the circumstance was noted, one-eleventh had not resided in London more than three months, and many only a few days; more than one-seventh had not resided more than six months; and considerably upwards of one-fourth not more than a year."—*Murchison*. In the autumn of 1861 a case of relapsing fever came under my care in King's College. The patient, a young gentleman, aged 21, came up to college from Wales, and was attacked during the first month of his residence in college. He experienced two relapses of considerable severity at intervals of seven days. The mucous membrane of the pharynx was severely affected, and remained intensely congested for several weeks. The disease ultimately terminated in diarrhœa, and an abundant herpetic eruption around the mouth, right eyelids, and right nostril, and conjunctivitis of the right eye. (J. H.)

Overcrowding and destitution are favourable conditions for the propagation of relapsing fever. The patients admitted into the London Fever Hospital came from the poorest and most populous districts, and the severest epidemics have occurred in times of famine.

2. *Exciting.* *A specific poison* generated within the bodies of persons in a state of starvation, and readily communicated to others. Medical men who have had experience of the disease are almost unanimous in the opinion that the disease is infectious. It successively attacks the members of a family, and spreads through contiguous houses. There are fair grounds for assuming that the disease has been several times imported both into England and Scotland from Ireland. The Scotch epidemic of 1847, in particular, has been ascribed to the immigration of a large number of destitute Irish. The epidemics in New York and other North American towns have been referred to the same cause. Medical men and nurses are liable to take the disease from patients under their care.

DIAGNOSIS.—Relapsing fever is liable to be mistaken for the other infectious fevers, and also for remittent fever. From *typhus* and *enteric fevers* it is distinguished—1. By its sudden invasion, without

any warning. 2. By the absence of rash. 3. By the complete intermission and relapse. In typhus fever cerebral symptoms are prominent. It is only in those rare cases of relapsing fever in which collapse and coma come on, that we can confound the two diseases. Enteric fever comes on imperceptibly, and the febrile symptoms are but slight in the earlier part of this disease. Moreover, vomiting, jaundice, and enlargement of the liver and spleen are often present in relapsing fever.

Relapsing fever is much more likely to be mistaken for *Remittent fever*, but the latter disease occurs in a malarious district. It is non-infectious, and there are merely remissions, and not intermissions, of the febrile paroxysms. Drs. Graves and Stokes, of Dublin, have called relapsing fever the "yellow fever of the British Islands." There are, indeed, so many points of resemblance between them, that the yellow fever of the tropics would appear at first sight to be little more than a severe form of relapsing fever. But as far as our knowledge extends, the diseases differ in their origin, their predilection, and modes of propagation, and we are therefore bound to regard them as distinct maladies.

Lastly, the access of relapsing fever may be confounded with that of *Variola*. Lumbar pain, vomiting, and high fever accompany the onset of both diseases; and, unless jaundice make its appearance, we may for the first day be unable to distinguish that the case is one of relapsing fever.

TREATMENT should be directed to the relief of the congestion of the internal organ. Vomiting may be encouraged for a time; or, if it be absent, it may be induced by means of a grain of tartrate of antimony and potash, given in divided doses. Cholagogue purgatives, such as gr. v *Pilulæ hydrargyri*, or 5 grains of calomel, in combination with 10 grains of compound ipecacuanha powder, should then be given. If there be much tenderness or pain in the hypochondria, leeches may be applied to these regions or to the margin of the anus. The headache may be relieved by a bladder of ice or a stream of iced water. Perspiration should be elicited by means of saline diaphoretics.

We must carefully regard the quantity of the urinary secretion. If it be little, we must resort to the treatment required in such a case (see *Suppression of Urine*). During the intermission great attention must be paid to the action of the bowels; the secretion of the liver should be encouraged, and, if excessive, controlled, but not stopped. An occasional dose of calomel will be of much service if dysenteric symptoms be absent. Tenesmus requires relief by opium, suppository, or by enemata.

Quinine and acids, in full doses, should be persevered in for a time in ordinary cases.

CHAPTER IV.

EXANTHEMATA—ERUPTIVE FEVERS.

DEFINITION.

CONTAGIOUS diseases, attacking a person, for the most part, only once, beginning with fever, and followed, after a short and nearly definite interval, by cutaneous eruptions.

VARIOLA	Small-pox.
VACCINA	Cow-pox.
VARICELLA	Chicken-pox.
RUBEOLA	Measles.
SCARLATINA	Scarlet Fever.
DIPHThERIA	Diphtheria.
PESTIS	Plague.

VARIOLA—SMALL-POX.

DEFINITION.—A contagious and infectious disease, setting in with severe febrile symptoms, followed by an eruption which passes through the successive forms of papule, vesicle, and pustule in about the space of eight days.

VARIETIES.—1. Variola discreta, distinct small-pox. 2. Variola confluens, confluent small-pox. 3. Varioloid, modified small-pox. Sydenham and Frank have also described a “Variola sine eruptione.”

1. VARIOLA DISCRETA—DISTINCT SMALL-POX.

SYMPTOMS.—An attack of distinct small-pox is ushered in by rigors, lassitude, headache, severe lumbar pains, extreme weakness in the back, and a white furred tongue, nausea, vomiting, and tenderness of the epigastrium. Drowsiness and sometimes coma, and in infants convulsions or epileptic fits, are occasionally present. These symptoms are followed by fever of the inflammatory type, with full frequent pulse, hot and dry skin, diminished secretions, restlessness, and, in some cases, delirium. The patient continues in this condition until the eruption, which is often preceded by sweating, appears. A considerable diminution of the fever generally occurs at this time.

At the end of *forty-eight hours* from the first occurrence of rigors, but sometimes earlier, and sometimes as late as the fourth day, the

eruption makes its appearance on the face and forehead, in the form of distinct minute papulæ, about the size of a pin's head, sensibly elevated above the surface of the skin, and feeling like small shot beneath the finger.

During the *third* day, or the *third* and *fourth* days, the eruption extends over the rest of the face, and travelling downwards, so to speak, successively involves the neck, shoulders, arms, and hands, trunk, legs, and lastly the feet. It is usually most abundant on the exposed parts of the body. On the covered parts of the body the papules are rose-coloured.

About the *fifth* day, a minute circular vesicle, depressed in the centre, containing a colourless fluid, and surrounded by an inflamed areola or margin, may be seen on the top of each pimple. The eruptive fever now undergoes a still further abatement, or entirely disappears.

About the *sixth* day, there is some swelling of the throat, with difficulty of swallowing, hoarseness, and an increased flow of viscid saliva. These symptoms arise from the extension of inflammation, or of the eruption itself, to the lining membrane of the mouth and fauces, where it can be seen in the form of small round white spots. The eyelids, the prepuce of the male and labia of the female, are similarly affected.

By the *eighth* day, the central depression has disappeared, the areola has attained its full size, and the contents of the vesicles have become purulent. The face swells; and the eyelids often become so enlarged as to close the eyes. The mouth, nose, and fauces are also covered with pustules.

By the *eighth* or *ninth* day of the eruption, the pustules have attained their full size, and are marked by a brown central spot. The inflammatory areola subsides, the tumefaction of the face disappears, and the hands and feet begin to swell.

After this time the pustules break, and their contents ooze out, and drying on the surface, form crusts, which in a short time fall off, and leave the skin beneath of a purplish-red colour, which often persists for weeks. The swelling of the hands and feet gradually subsides, and about the seventeenth day the patient is convalescent. In the more severe cases permanent white scars are left upon the skin of the face, and of the exposed parts of the body.

The period occupied by the change from pimple to pustule is called the period of *maturation*. At different stages of this process, according to the amount of eruption, but generally as early as the eighth day, *secondary fever* sets in, characterised by extreme restlessness, sleepless nights, a frequent and quick pulse, a dry brown tongue, scanty and high-coloured urine, and frequently by delirium, especially at night. The bowels are usually constipated, sometimes obstinately so.

2. VARIOLA CONFLUENS—CONFLUENT SMALL-POX.

SYMPTOMS.—Confluent small-pox differs from the distinct form only in degree. The eruptive fever is more intense, and increases from

the first appearance of the rash to the period of maturation. The *secondary fever* is also more severe, and often assumes the typhous character. Coma and delirium are more frequent concomitants; and severe diarrhœa sometimes sets in.

The eruption is also irregular in its appearance and progress. It is usually preceded by a red efflorescence upon the face, from which the pustules emerge on the second day in the form of small red points, which soon coalesce into clusters with pale and flaccid interspaces; resembling those of measles. Maturation takes place earlier; but the pustules, instead of being globular, are flat and irregular in shape, and sometimes contain, instead of pus, a brownish ichor. The inflammation extends to the subjacent cellular membrane, and sometimes ends in extensive sloughing. The swelling of the face and salivation commence early, and rise to a great height. The fever, though it generally undergoes a slight remission, does not cease, upon the appearance of the rash; and about the ninth day it suffers a remarkable exacerbation, and in some instances all the worst symptoms of the typhous condition supervene. The eruption assumes a dark livid or black hue; petechiæ, and passive hæmorrhages, bloody urine or dysentery, make their appearance; there are coma, convulsions, and sordes on the lips and teeth, and the patient is often carried off on the night of the eleventh day from the commencement of the disease. In cases of recovery, the scars are much deeper and more extensive than in the milder form.

3. VARIOLOID—MODIFIED SMALL-POX.

Small-pox may be greatly modified in its severity, and otherwise changed in character by three causes:—Inoculation, vaccination, and a previous attack of the disease.

SYMPTOMS.—Inoculated small-pox has now lost much of the interest that formerly attached to it; but a brief description of its phenomena is desirable. On the second day after the operation an orange-coloured stain shows itself round the incision. On the fourth or fifth day, the skin is hard and inflamed, and a vesicle appears. About the sixth day some pain and stiffness are experienced in the axilla. On the seventh day, a red areola forms round the vesicle, which is enlarged. On the seventh, eighth, or ninth day, the primary fever sets in, and after lasting three or four days, the 'secondary eruption' appears in three distinct crops, on the face, neck, and upper extremities, then on the trunk, and lastly on the lower extremities. The 'primary pustule' runs a more rapid course than the secondary eruption. The fever throughout is very mild, the pustules few—from ten to two hundred—and the mortality very slight (probably about one per cent.).

Small-pox modified by a previous attack, or by vaccination, also differs in several respects from the disease as it occurs in unprotected persons. The principal points of distinction are the following:—The eruptive fever, though often extremely intense, generally continues during only one day. The patient often complains of some indisposi-

tion in the afternoon, passes an extremely restless night, and finds the eruption out in the morning. The first places in which it makes its appearance are generally the wrist and alæ of the nose. A pimple appearing in the latter situation, will often give the first clue to the nature of the disease. The eruption itself runs a shorter course, is rarely confluent, and presents none of the uniformity of the regular disease. A few of the pustules, though small, are regularly formed, and present the central depression. Several of the pimples do not pass to the form of vesicle, and the vesicles themselves shrivel and dry up (*Horn-pock*), or they are unusually persistent, and from their transparent appearance are called *Pearl-pock*. All the stages of the eruption may be seen on the body at the same time, and all of them imperfect. As soon as the eruption appears, the patient is well, unless it happen to be sufficiently extensive to give rise to secondary fever.

CAUSE.—A specific poison, emanating from persons labouring under the disease, or from clothes or other articles worn or used by them; or implanted by the introduction of the variolous matter into the system by inoculation, or by the application of the scab.

PROGNOSIS.—*Favourable*. The pustules distinct; the march of the disease regular; the subject healthy. The period of childhood and youth. The modified form of the disease.

Unfavourable. The confluent form of the disease; the fever assuming the typhous condition, and the pustules becoming flattened, livid, or interspersed with petechiæ. The sudden disappearance of the rash, with subsidence of the swelling of the face or extremities. and depression of the pustules, followed by great prostration of strength, universal pallor of the skin, great anxiety, oppression at the chest, syncope, convulsions, coma, or delirium. A sudden increase of frequency in the pulse, great dyspnoea. Excessive vomiting before the rash, and continued after its appearance. Blood in the urine, and other secretions. Complications with visceral disease, such as inflammatory affections of the brain, of the throat, larynx, or lungs, or of the alimentary canal, and suppurations in these viscera, or in the joints. Infancy, and advanced age.

In general, the fate of the patient is determined in the interval between the eleventh and seventeenth day, but death may take place during the primary fever. The crisis of the secondary fever is occasionally accompanied by diarrhœa.

SEQUELÆ.—Abscesses, ulcers, boils, suppuration of the glands of the neck, sloughing of the skin, erysipelas, suppuration of the joints, resulting in permanent lameness; ophthalmia, followed by blindness from opacity of the cornea; deafness, following suppuration of the internal ear; suffocation, from swelling of the glottis; inflammation of the serous membranes of the chest and abdomen; pleurisy, terminating in empyema; inflammation of the lungs; hæmoptysis; hæmaturia, inflammation and suppuration of the kidneys; in females, menorrhagia; in pregnant females, abortion. Melancholia followed by mania may

arise at this period. During the period of convalescence, patients may be attacked with other prevalent diseases, such as typhus fever, erysipelas, and hospital gangrene.

MORBID ANATOMY.—On the skin, the eruption already described. On the conjunctiva of the eye, and on the lining membrane of the air-passages, on the mouth, tongue, nostrils, palate, and fauces, on the prepuce and labia, small patches of false membrane, or of detached epithelium, or denuded spots of mucous membrane, or actual pustules. In rare cases, these appearances extend into the bronchial tubes and through the whole length of the intestines. There are traces of local inflammation in various internal organs; the texture of the viscera is often softened, and the entire body runs rapidly into putrefaction.

DIAGNOSIS.—The suddenness of the attack, the intense pain in the head, back, and loins, the sickness, the absence of the local affections of the other severe exanthemata, the prevalence of the disease at the time, and the exposure to contagion, afford a probability in favour of small-pox. The regular succession of appearances, and of changes in the eruption, afterwards renders the distinction easy. Before the appearance of the eruption the diagnosis is often exceedingly difficult. A typical case may be mistaken for *relapsing fever* (page 338); a modified form may be difficult to distinguish from *enteric fever* (page 333). The primary fever may be accompanied by profuse sour-smelling perspiration, associated with general muscular pains, amongst which the lumbar pain is not particularly regarded, and we are liable to assume the disease to be *rheumatic fever*; and it is rheumatic fever, without doubt, but there is small-pox superadded to it. In the case which has suggested these remarks, profuse sour-smelling sweat continued for forty-eight hours before the rash appeared; the muscular pains remained for two days longer. In another case which came under my care, the eruption was preceded by a copious, finely maculated, fiery crimson petechial rash, overspreading the trunk and upper parts of the limbs, and confluent at the flexures of the arms and thighs into vivid crimson patches, surrounded by discrete but crowded petechiæ. The rest of the skin was of a dusky crimson colour, and the surface was intensely hot. Two rose-coloured papules were noticed on the chest: the lumbar pain was intolerable. Twelve hours afterwards the eruption began to appear; and, although it was far disproportionate to the petechial rash, the disease was of the confluent variety. At the outset such a case may be mistaken for *typhus*. (J. H.)

It is sometimes difficult to distinguish the papular eruption of small-pox from an acute attack of *syphilitic lichen*. In the early stage of the eruption of variola, the papulæ on the alæ of the nose and upper lip give a highly characteristic appearance to the countenance.

MORTALITY.—The deaths in the metropolis, in a million persons, vary from 90 to 900, and average 400. The mortality has been greatly influenced by legislation. *Rate of mortality*:—In those unpro-

ted by vaccination or by previous attack, about 1 in 4. Average of twenty-five years at the Small-pox Hospital prior to the introduction of vaccination, 32 per cent., or about one-third; extremes in different epidemics 15 per cent. and 42 per cent. *Proportion to total deaths from all causes* prior to 1800, 16 per cent. *Comparative mortality of the unprotected and of those protected by vaccination.*—In the epidemic of 1838, unprotected (all forms of the disease), 157 in 396, or 1 in 2.52; protected, 31 in 298, or 1 in 9.61. The natural small-pox, therefore, is nearly four times as fatal as the modified.—(Dr. Gregory.) *Mortality in the several forms of natural small-pox.*—Confluent, 1 in 2; semi-confluent, 1 in 10; discrete, 0 in 19. *Mortality at different ages.*—From 0—5 years, 42 per cent.; 5—10, 24 per cent.; 10—15, 19 per cent.; 15—20, 24 per cent.; 20—30, 34 per cent.; 30—40, 46½ per cent.; 40—50, 58 per cent.; 50 and upwards, 79 per cent. (Dr. W. Farr. Periods; from the year 1780 to 1799, and from 1826 to 1835.)

LAWS OF INFECTION.—Communicated by contact or through the air, by the living and dead body; by the contents of the vesicles and pustules; by the dried scabs; or by substances imbued with the variolous matter. Infecting distance considerable—from 30 to 50 feet. or more. The period at which a patient begins to be able to communicate the affection, and at which he ceases to be dangerous to others, has not been ascertained. It rarely occurs twice in the same person: about one per cent. it is believed are liable to a second attack. May attack the fœtus in utero. *Period of incubation.*—Usual duration, twelve days; limits, ten to sixteen days. Epidemic in certain years, as in 1781, 1796, 1825, 1838, 1840, 1844, 1848, and 1863. Annual fluctuation considerable, *e. g.* in 15 years (from 1840 to 1854), the number of deaths in London, in a million inhabitants, was as high as 890 in 1844, and as low as 225 in the year preceding, and only 87 in 1853. This fluctuation is in part due to recent legislation.

TREATMENT.—*Before the appearance of the eruptive fever*, the treatment will be the same, whatever may be the nature of the impending disease. An emetic (Pulv. ipecac. gr. xx. or Antim. tartarati gr. i.), followed by a brisk saline aperient (Magnes. sulph. ʒss.; Infus. sennæ c. f ʒiss.; Tinct. sennæ f ʒss.), to remove any offending matter from the alimentary canal; local bleeding in the plethoric; the antiphlogistic regimen, if inflammatory symptoms run high; stimulants in extreme nervous depression; opium in great nervous irritability; bleeding and stimulants in congestion, to promote reaction, and to relieve the circulation.

During the eruptive fever the febrile symptoms, if considerable, are to be moderated by exposing the body of the patient to a cool atmosphere, by frequently administering cold diluent fluids, as lemonade, cold toast-water, soda-water, &c.; at the same time administering saline aperients, so as to keep the bowels loose. Cold affusion may also be employed with advantage when there is much heat of skin; but cold or tepid sponging, limited to the hands and arms, is to be preferred.

After the appearance of the eruption, the indications are:

I. To moderate the fever when violent.

II. To support the strength when deficient.

III. To subdue local inflammation and relieve occasional symptoms.

I. As the fever at once subsides on the appearance of copious perspiration, our object must be to promote it. After an emetic of tartarated antimony, we may give f. ʒi . liquoris ammoniæ acetatis, with gr. iii. ammoniæ carbonatis, every four hours. A full dose of tincture of opium will generally be required at bedtime. The apartment must be kept cool and well ventilated.

II. If the patient's strength fail, he must be supported by tonics or stimulants, according to the degree of the existing debility. Quinine, or the tonic infusions, may be prescribed in the lesser degrees of weakness, wine and ammonia when the debility is more considerable. If with the debility there be great irritability and restlessness, opium may be combined with the tonic or stimulant.

III. Ophthalmia, if it be severe, will require leeches to the temples. In milder cases, solution of nitrate of silver (gr. v.—f. ʒi .) should be applied. Olive oil, cold cream, or simply tepid water are grateful applications to the swollen and irritable face.

If the throat be attacked, and there be difficulty in swallowing, leeches may be applied to the neck, and gargles of infusion of roses directed.

Determination to the head or chest, or other viscera, must be treated by the remedies applicable to idiopathic inflammation of the same parts. Blisters and counter-irritants must be cautiously employed, especially in those cases where the skin is already the seat of inflammation.

Obstinate vomiting, which in this disease sometimes proves both a troublesome and dangerous symptom, is best treated by effervescent salines, with a few drops of laudanum. If there be tenderness at the epigastrium, a warm bread-and-water poultice may be applied, preceded, in severe cases, by a few leeches.

If the febrile symptoms indicate a typhous tendency, the treatment recommended in that stage of continued fever should be resorted to.

If, after the eruptive fever has passed away, the patient suffer from profuse sweats, a cool regimen, and the dilute mineral acids in combination with tonics (Acid. sulph. dil. ʒxx .; Infus. quassia, f. ʒi .; Tinct. lupuli, f. ʒss .) should be given three or four times in the day.

Diarrhœa, when excessive, is to be checked by small doses of laudanum (3—5 drops), with chalk mixture, or by the Pulvis cretæ co. c. Opio, in doses of ten grains or a scruple, repeated every three or four hours.

When the eruption suddenly recedes, or the pocks sink and shrink, and alarming symptoms, such as rigors, convulsions, or delirium, supervene, recourse must be had to depletion and counter-irritants—leeches to the temples, blisters to the nape of the neck, and sinapisms to the feet and legs. The cold dash applied to the head whilst the body is in a warm or vapour-bath, may be used with great benefit.

The secondary fever requires the treatment of continued fever of the same type and degree of severity. When much irritation is present

full doses of opium are indicated ; and in extreme cases a small bleeding from the arm, followed by full doses of opium.

In favourable cases of modified small-pox but little treatment is required beyond the administration of an occasional saline aperient, and the avoidance of excess in diet.

In all cases of small-pox the warm bath should be used repeatedly during the stage of convalescence.

Prevention of pitting.—Various kinds of treatment have been recommended for preventing the pitting of small-pox. All of them consist either (1) in protecting the parts from the air ; or (2) in letting out the contents of the vesicles before they have changed from lymph to pus ; or (3) in exciting common, in place of specific, inflammation.

1. In order to protect the surface from the air, and to give support to the swollen skin, a mixture of equal parts of collodion and castor oil may be painted over the face in males, and the face, neck, and arms in females.

2. Puncturing the vesicles as soon as they are fully developed, with a fine needle, and absorbing their contents with soft cotton, is said to be an effectual method, but it is very tedious.

3. Nitrate of silver in substance, or in strong solution, applied to the pustules is also advantageous. Tincture of iodine has been substituted for the solution of lunar caustic, and with benefit.

VACCINA—COW-POX.

SYNONYMS.—Vacciola, vaccinia, kine-pox, vaccine disease.

The benefits conferred on mankind by the discovery of vaccination, as a preventive of small-pox, are now universally admitted. If the virus be genuine and properly inserted, the body is, to a certain extent, protected from small-pox, and the disease, if it occur, is in most cases greatly mitigated. The protection seems, however, to be less effectual during severe epidemics, when the power of the contagion is at its height ; and the mortality of the protected seems to be increased when they are treated in hospitals for the cure of small-pox.

MODE OF PERFORMING THE OPERATION.—Three or four punctures should be made near each other, in one or in both arms, about the insertion of the deltoid muscle. The skin being made tense, a sharp lancet should be inserted obliquely downwards into the skin, so as to produce a trace of blood. The lancet must be perfectly clean and free from grease, in order that the vaccine matter may adhere to it. When the matter is taken from the arm of another child, the lancet should be dipped in the lymph of the vesicle, and then inserted in the punctures. If preserved on slips of glass, or on points, it must be first moistened by the breath.

DESCRIPTION OF THE AREOLA.

When the operation has been properly performed, the course of the eruption is somewhat as follows :—

Second day.—Small red spots appear which feel hard, but, when viewed under the microscope, are seen to be vesicular.

Third or fourth day.—The spots are larger and more perceptible.

Fifth day.—Small pearly circular or oval vesicles corresponding to the punctures, appear and contain a minute quantity of transparent fluid.

Eighth day.—The vesicle has attained its perfect form and full size, with depressed surface and raised margin. On the evening of this day the vesicle begins to be surrounded by a circular rosy areola, and the skin for some distance around it is tense and painful. There is also slight febrile disturbance.

Ninth and tenth days.—The areola increases, and is often accompanied by extensive erythema of the arm, and sometimes by a lichenous eruption over the whole body.

Eleventh day.—By this time the vesicle, if it have not been opened, has burst, the areola has begun to fade, the centre of the vesicle is covered with a brown scab, which first hardens and blackens, and about the *twentieth* day falls off, leaving a deep mark, or indentation on the skin, of a circular form, with as many pits as there were cells in the vesicle, and proportioned in size to the previous inflammation. Unless all these appearances are observed the vaccine disease has been imperfectly communicated, and re-vaccination is absolutely necessary.

PRECAUTIONS.—The best time for taking the lymph is from the fifth to the eighth day; after this time it cannot be depended on. The disease will not be properly communicated should there be a chronic eruption on the arms; if scarlatina, measles, or other cutaneous diseases supervene; or if dentition, disordered bowels, or any other malady be present; or if any cause, such as friction or injury, have disturbed the progress of the vesicle. Sometimes boils, pustules, and leprous and impetiginous eruptions succeed the vaccine disease; but this seldom happens when the child's health is good at the time of vaccination. Such eruptions are readily cured by mercurial alteratives and gentle aperients.

Infants may be vaccinated at any time after the sixth week. The age of three months is to be preferred, if the child be healthy.

As a rule, vaccination should be repeated every seven years up to or a little beyond the middle period of life. Re-vaccination may, however, be generally assumed to be unnecessary so long as the person can show three well marked excavated scars. As it may be practised without inconvenience, it may be well to resort to it when epidemics prevail, to insure protection or to allay the fears of timid persons.

The best argument for re-vaccination is the result of that operation in the Prussian army. In the year 1841 nearly 45,000 soldiers were re-vaccinated, and though before that time varioloid disease was very prevalent in the barracks, only eight cases occurred afterwards.

As it is highly important that the amount of protection afforded by vaccination should be understood, the following tables have been constructed :—

EPIDEMIC IN SCOTLAND, 1818-1819. DR. JOHN THOMPSON.

	Unprotected.	Small-pox second time.	Small-pox after Vaccination.
Cases . . .	205	71	310
Deaths . . .	50	3	1
Proportion . .	1 in 4	1 in 23	1 in 310

The following table, reduced to an uniform scale of 15,000, is founded on the facts recorded by M. Favart during an epidemic of small-pox which took place at Marseilles in 1828. The estimated population under 30 years of age was 40,000, of whom 30,000 had been vaccinated, 2,000 had had casual small-pox, or small-pox by inoculation, and 8,000 were unprotected.

MARSEILLES.—EPIDEMIC OF 1828.—ESTIMATED POPULATION, 40,000.

	Unprotected.	Previous Small-pox or Inoculated.	Vaccinated.
Estimated number . .	15,000	15,000	15,000
Attacked	7,500	150	1,000
Died	1,875	30	10
Proportion attacked .	1 in 2	1 in 100	1 in 15
Proportion of deaths to attacks }	1 in 4	1 in 5	1 in 100

The inference to be drawn from these facts is, that vaccination, though a less complete protection against attacks of small-pox than inoculation or a previous attack of the disease, is the best existing protection against a fatal attack.

From a statement appended to a paper read by Dr. Gregory before the Medico-Chirurgical Society of London, March 9, 1852, it appears that in the Small-pox Hospital, during the 11 years 1841-1851, there were 4,091 admissions with small-pox, distributed as follows :—

	Patients.	Deaths.	Mortality per cent.
Not alleging any protection . . .	1,722	629	37
Alleging prior small-pox . . .	36	6	17
„ vaccination, but no scars . . .	166	56	34
„ vaccination, and scars . . .	2,167	147	7

Dr. Gregory (Libr. of Med., vol. i. p. 323) was of opinion “that all idea of banishing small-pox from the earth is vain and illusory.” The facts which he adduced did not however bear out this view of the case; and where vaccination has been extended for a term of years to an entire population, without exception, there is evidence that small-pox has disappeared. (See Sir Gilbert Blane’s Essay on Vaccination and Baron’s Life of Jenner.)

VARICELLA—THE CHICKEN-POX.

DEFINITION.—A contagious and infectious disease ushered in by slight febrile symptoms, followed by a vesicular eruption which generally runs its course in five days.

SYNONYMS.—Swine-pox, Bastard-pox, Gland-pox, Crystalli.

SYMPTOMS.—Within twenty-four hours after slight symptoms of fever, such as lassitude, loss of sleep, wandering pains, and loss of appetite, an eruption appears; first on the back, consisting of small reddish pimples, much resembling the first appearance of the small-pox. On the *second* day, the red pimples have become small vesicles, containing a colorless fluid, and sometimes a yellowish transparent liquor. On the *third*, the vesicles arrive at maturity. Soon after, the fluid becomes extravasated by spontaneous or accidental rupture of the tender vesicles, or it collapses and dries; whichever happens, a thin dark-brown or yellowish scab is formed. Pus is never formed, as in variola. Generally before the *fifth* day the whole eruption disappears, without leaving behind it any cicatrix or mark.

CAUSE.—*Predisposing.* Infancy and childhood.—*Exciting.* Contagion.

DIAGNOSIS.—*From variola.* By the slight fever; by the short interval (24 hours) between the first symptoms and the appearance of the eruption; by the pimples first appearing on the back; by the form and condition of the eruption, which is never pustular nor depressed; by the separation of the scaly scabs on about the fifth day, when the eruption in variola is only just completed. It is distinguished from modified small-pox by the absence of pits from all the vesicles.

PROGNOSIS.—Highly favourable.

LAWS OF INFECTION.—Communicated by contagion, inoculation, and fomites, and through the air. The infection less powerful than that of the other febrile exanthemata, and the infecting distance probably small. The disease, as a general rule, affects the system only once. The latent period is probably considerable.

TREATMENT.—This complaint seldom requires the aid of medicine. Gentle saline aperients may be prescribed, combined with small doses of tartar-emetic, if the fever should happen to exceed its usual moderate standard. The treatment may be terminated by a warm bath.

RUBEOLA—THE MEASLES.

DEFINITION.—A continued contagious and infectious fever, commencing with catarrhal symptoms, and followed, about the fourth day, by a peculiar eruption of the skin.

SYNONYM.—Morbilli.

SPECIES.—1. *Rubeola vulgaris*; 2. *Rubeola maligna*; 3. *Rubeola sine catarrho*.

1. RUBEOLA VULGARIS.

SYNONYMS.—*Morbilli vulgares*; *Morbilli mitiores*.

SYMPTOMS.—The premonitory symptoms are those of catarrh. After rigors and flushes, lassitude, heaviness, pain in the head and drowsiness, there are ringing cough, hoarseness, difficulty of breathing, frequent sneezing, itching of the face, smarting of the eyes, and swelling of the eyelids, with copious secretion of watery fluid from the eyes and nostrils; nausea or vomiting, thirst, furred tongue, frequent pulse, and the general symptoms of fever.

On the *fourth*, but sometimes as early as the third, or as late as the fifth day, small red circular spots, resembling flea-bites, appear, first on the face, neck, and upper extremities, then on the trunk, and afterwards on the lower extremities. The three crops of the eruption are commonly separated by an interval of twenty-four hours. The spots are generally in crescentic clusters, of a deep-red colour, do not rise into visible pimples, but are found by the touch to project slightly above the surface. Sometimes, however, the spots are distinctly papular, and, at the height of the eruption, vesicular.

About the *eighth* day, but sometimes as early as the *fifth* or *sixth*, the colour of the rash begins to fade: first upon the face, neck, and arms, then upon the trunk, and lastly on the legs; and, in a day or two more, the eruption entirely disappears, with a mealy or furfuraeous desquamation of the cuticle. At this period diarrhœa sometimes sets in. The fever and catarrhal symptoms subside at the same time, and the expectoration changes from a transparent mucus to an opaque-whitish or yellowish-white sputum.

The catarrhal and febrile symptoms sometimes subside on the appearance of the rash; but in the majority of cases they increase, and are often accompanied by pulmonary symptoms, the cough becomes troublesome, and the breathing short, frequent, and wheezy. The stethoscope reveals more or less diffuse bronchitis. Symptoms of pneumonia occasionally supervene.

The usual duration of the disease is from nine to twelve days. The patient often convalesces very slowly.

2. RUBEOLA MALIGNA.

SYNONYMS.—*Morbilli nigri*. *Morbilli graviores*.

This form of the disease is ushered in by more severe premonitory symptoms, and soon assumes the typhous character. The eruption appears early, but irregularly, alternately receding and reappearing. It assumes a dark or livid hue (*rubeola nigra*), and is often interspersed with petechiæ. The fauces are of dusky-red or claret colour. All the symptoms are aggravated; there is great tenderness in the abdomen, with dark offensive stools; delirium is present, the mucous membrane of the air passages is gravely affected, croup and severe pneumonia

are imminent, and the patient may die asphyxiated by the congestion of the lungs, or exhausted by diarrhœa, or comatose from the severity of the head-affection.

3. RUBEOLA SINE CATARRHO.

In rare instances the primary fever and eruption of measles show themselves in a mild form, without the accompanying catarrhal symptoms. On the other hand, cases are believed to occur in which a fever, resembling in character and duration that of measles, takes place with catarrhal symptoms, but without the cutaneous eruption.

CAUSE.—*Predisposing.* The period of infancy and childhood; but the disease may occur at any age. The seasons of winter and spring. —*Exciting.* A specific contagion, of which patients are generally susceptible only once during their lives.

MORTALITY.—The number of deaths in a million of those residing in the metropolis varies from 250 to 1,120, and averages 575.—*Rate of mortality.* This varies in different epidemics from 1 in 3 to 1 in 40, the average being 1 in 15.

LAWS OF INFECTION.—The disease spreads from person to person, by fomites and through the air; it may also be communicated by blood from the arm, or by serum from the vesicles mixed with the rash. The disease very rarely occurs a second time. Its period of incubation is believed to be from 6 to 16 days (Heberden gives cases ranging from 10 to 14 days); and there is reason to think that the disease may be communicated during the primary fever. Epidemic in certain seasons, as in 1845 and 1847. Annual fluctuations considerable: *e.g.*, 1,122 deaths in Loudou in one million inhabitants in 1845, and only 249 deaths in 1852.

DIAGNOSIS.—From *Scarlatina* by the darker hue of the rash, the crescentic arrangement of the patches, and its appearance, as a general rule, on or about the fourth, instead of the second day. Also by the marked catarrhal symptoms, and the absence of the severe affection of the throat; by its shorter course; and by its less fatal character. From *Roseola*, by the catarrhal symptoms; by the darker hue and more sudden appearance of the eruption; and by the greater severity of the symptoms. From *Typhus*, see page 318.

PROGNOSIS.—Generally favourable, unless in the form of *Rubeola Maligna*.—*Favourable Symptoms.* The febrile and other symptoms slight; moderate diarrhœa; epistaxis; early and free expectoration; a moist skin when the eruption appears.—*Unfavourable.* A high degree of fever; hot and dry skin; hurried and difficult breathing; flushed countenance; unusually hard pulse. The fever increasing after the appearance of the rash, and assuming the form of hectic, or of typhus; great pain in the head and eyes; shooting pains in the chest; symptoms of pneumonia or cynanche; convulsions; the pulse rapid and small; coexistence with whooping-cough; delirium, or coma; continued diarrhœa or vomiting. The sudden disappearance of the

rash, succeeded by delirium, great anxiety, hurried or laborious respiration, acute pains in the chest, or violent diarrhœa; the eruption assuming a livid hue.

SEQUELÆ.—Pneumonia, œdema of the lungs, pleurisy, croup, bronchitis, phthisis; diarrhœa, enlargement of the mesenteric glands; ophthalmia, abscesses in the ear, swelling and suppuration of the parotid, submaxillary or cervical glands; aphthæ and gangrene of the mucous membrane of the mouth: whooping cough.

MORBID ANATOMY.—Marks of inflammation in the internal organs, especially the air-passages and lungs.

TREATMENT.

Of the Rubeoletta Vulgaris.

Indications.—I. To diminish inflammatory action. II. To relieve urgent symptoms.

I. The first indication is fulfilled by abstinence from animal food and strict adherence to the antiphlogistic diet; by placing the patient in a moderately-cool atmosphere, carefully guarding against exposure to cold; by the occasional exhibition of saline aperients, and by the common refrigerants and diaphoretics, such as acetate of ammonia combined with ipecacuanha.

When the febrile symptoms run high, and more especially when there is a threatening of local inflammation, tartar-emetic must be given in nauseating doses, at short intervals.

II. If inflammation of the lungs or larynx supervenes, leeches must be applied to the chest or neck, in number proportioned to the age of the patient and the severity of the attack. The patient should then be placed in a warm bath, and nauseating doses of tartar-emetic afterwards given every two, three, or four hours. A bread-and-water poultice may also be applied over the sternum, but blisters should be avoided.

Hoarseness, cough, and inflammation of the fauces will be palliated by barley-water, with acacia gum, by thin arrowroot, or by the compound decoction of barley, taken frequently in small quantities, with the chill removed. The addition of a little nitre, or of a small quantity of lemon-juice, will render these drinks more palatable. Inhalation of the steam of warm water is also serviceable.

Mild opiates are sometimes useful after the febrile action is abated. An opiate, given at bedtime, should be combined with a saline diaphoretic, as in Dover's powder. Tincture of opium should be given in combination with the liq. ammon. acetatis.

Diarrhœa may be treated by the compound chalk and opium powder three or four times a-day, the dose of the powder being increased, and emollient clysters administered from time to time, if the diarrhœa become troublesome. The more powerful astringent remedies recommended in the treatment of diarrhœa (see *Diarrhœa*) should be reserved till this more simple treatment has failed.

When diarrhœa does not take place spontaneously, the bowels must be relieved by some simple saline aperient.

Of the Rubeola Maligna.

The treatment of malignant measles is similar to that of the typhous stage of continued fever; it requires the exhibition of mineral acids, quinine, wine, and ammonia, according to the degree of exhaustion.

When the eruption of measles disappears before the proper period, and convulsions, great anxiety, or delirium take place, an attempt must be made to restore the eruption to the skin, by the immediate use of the warm bath, the application of sinapisms or blisters to the chest and feet, the administration of warm wine and water, ammonia, camphor, æther, or other appropriate stimulants. The liquor ammoniæ acetatis, in doses of from f. ʒi to f. ʒss, according to the age, may be administered at short intervals.

During convalescence, the diet should be nutritious, the bowels regulated, and the dress warm. Great care should be taken to avoid exposure to cold, and drafts of cold air.

PROPHYLAXIS.—The same precautions are required to prevent the spread of the contagion, as in the case of other contagious maladies. Inoculation with blood taken from the patches, with the serum of the vesicles, when the eruption is vesicular, or with the secretion of the conjunctiva, has been practised with some advantage. The cases which have followed inoculation have been mild and favourable.

SCARLATINA—SCARLET FEVER.

DEFINITION.—A continued contagious and infectious fever, accompanied by inflammation of the fauces, and by a scarlet eruption on the skin, setting-in on or about the second day, and terminating in desquamation of the cuticle.

SPECIES.—1. *Scarlatina simplex*; 2. *Scarlatina anginosa*; 3. *Scarlatina maligna*; 4. *Scarlatina sine eruptione*.

1. SCARLATINA SIMPLEX.

SYNONYM.—*Scarlatina sine angina*. *Scarlatina mitis*.

SYMPTOMS.—This disease is characterised by the slight affection of the throat. It sets in with the usual premonitory symptoms of fever—viz., cold chills, shivering, nausea, and sometimes vomiting, with pain in the head, back, and limbs, thirst, hot skin, frequent pulse, restlessness, and sleeplessness. On the *second* day, in the greater number of cases, a bright scarlet efflorescence is perceptible on the face, neck, and arms, whence it extends over the trunk and limbs. At first it consists of innumerable red points, separated by interstices of the natural colour: these points soon coalesce, so that in a few hours the redness becomes universal; but it is peculiarly distinct at the bends of the joints, on the chest and abdomen, the hips and loins.

The skin is rendered pale by pressure, but the colour immediately returns. After the lapse of *one* or *two* days, the efflorescence again becomes partial, is arranged in large irregular patches, and does not disappear on pressure. The skin is perceptibly rough to the touch, and in some instances it is studded with small miliary vesicles. The rash generally begins to decline on the *fifth* day, is very indistinct on the *sixth*, and wholly disappears by the *eighth* day. Desquamation of the cuticle generally begins on the parts first affected about the end of the *fifth* day, and soon extends to the entire body. The cuticle separates as a scurf from the trunk and limbs, and in large scales from the hands and feet. The desquamation is often accompanied by great itching, irritation, and tenderness of the skin.

The eruption is preceded or accompanied by a sore throat, and some difficulty of swallowing; and, on inspection, the tonsils are found slightly enlarged and inflamed, and coated with a white tenacious mucus. The eyelids, lips, edges of the tongue, soft palate, pharynx and nostrils, are also of a red colour. The papillæ of the tongue are elongated, and project as bright-red points through the white mucus which covers its surface; or the whole tongue is of a bright-red colour with prominent papillæ. The tongue in the first case resembles a white strawberry; in the second a red one.

The fever does not abate on the appearance of the rash, but subsides with it, leaving, in most cases, great debility behind it. The pulse is generally very frequent (120 or 130), and the skin very hot (105°, 106°, and even 112° Fahrenheit). There is generally some increase of fever at night, with slight delirium, even in favourable cases. The bowels are frequently confined, and nausea and vomiting are not of very uncommon occurrence. The urine is often scanty and high coloured, and, in the decline of the disease, is generally found to contain albumen.

Although the eruption in scarlet fever usually occurs on the second day, there are many exceptions to the rule. On the one hand there are cases in which the rash appears much earlier than the second day, as in a lad of sixteen, who felt ill for the first time at five o'clock in the evening, and had the eruption full out upon him before twelve o'clock at night. On the other hand, during the prevalence of scarlet fever, cases are constantly occurring in which there is slight sore throat, and a suspicious appearance of tongue, with little disturbance of health for three, four, or five days, at the end of which time the eruption makes its appearance, and the disease generally runs a mild course. These cases present some difficulty; but however slight the other symptoms may be, there is always during this latent period a very frequent, full, and peculiarly compressible pulse. Whenever this pulse exists, some febrile disease (and scarlatina if ripe at the time) may be confidently looked for. (G.)

2. SCARLATINA ANGINOSA.

SYNONYM.—Fothergill's sore throat. Scarlatina mitior.

SYMPTOMS.—Those of scarlatina simplex, but in an aggravated form, with a more severe affection of the throat and parts adjacent.

The submaxillary glands are enlarged and painful to the touch; the soft palate, uvula, tonsils, and pharynx, as far as the eye can reach, are of a florid red colour, the tonsils and soft palate much swollen, and the uvula enlarged and lengthened. A thick mucus collects at the back of the throat, and proves very troublesome to the patient, and specks are often observed resembling the sloughs in cynanche maligna; yet ulceration seldom takes place, and when it does occur, is superficial. Smooth yellow patches of fibrous exudation frequently form over the inflamed, excoriated, or ulcerated tonsils or pillars of the fauces, in all respects resembling the exudation of diphtheria. The mouth is opened with difficulty, there is great pain in swallowing, and liquids often return through the nostrils. The tongue is very red, and the papillæ are very prominent. The inflammation may also extend to the mucous membrane of the nose, and through the Eustachian tube to the ears, followed by thin purulent discharge from those parts. The skin is of a deeper colour, and the eruption spreads more rapidly over the surface.

Not unfrequently, after a few days' amendment, an unaccountable languor and debility supervene; the pulse is accelerated; the sleep is disturbed; the appetite is lost; the secretion of urine is nearly suppressed; and dropsical effusions take place into the limbs, abdomen, or chest, or in several parts of the body at the same time.

3. SCARLATINA MALIGNA.

SYNONYM.—Scarlatina gravior.

SYMPTOMS.—The tonsils, though less swollen than in scarlatina anginosa, are of a deeper red colour, and soon become the seat of rapid, extensive, and deep ulcers, interspersed with dark sloughs, which are detached slowly, leaving deep ragged sores, which heal with difficulty. Aphthous ulcers also form on the interior of the cheek. The inflammation, extending into the nostrils, causes a thin corrosive discharge which excoriates the lip and inflames the parts with which it comes in contact, and the salivary glands are much swollen and inflamed. The eruption appears late, in irregular patches of a paler colour, which sometimes disappear suddenly. The other symptoms are those of the typhous form of continued fever.

4. SCARLATINA SINE ERUPTIONE.

SYNONYM.—Scarlatina latens.

Sometimes the disease assumes so mild a form as altogether escapes detection until some sequela, such as general anasarca, appears to declare that the previous slight indisposition, "a feverish cold," was an attack of scarlatina. We must be careful not to overlook such cases, as, from want of proper nursing and precautions, the consequences they entail are as bad as, or even worse, than those of a severe form of the disease.

It is not uncommon for those who have had scarlet fever in its

usual form, when again exposed to the contagion to have the characteristic sore throat succeeding the usual premonitory symptoms, but no eruption. Desquamation of the cuticle, however, occurs in some of these cases, where no distinct rash has appeared on the skin. Such persons are capable of communicating the common type of the disease to others.

DURATION OF SCARLET FEVER.—In cases of ordinary severity, the first stage (from the commencement to the appearance of the rash) twenty-four, forty-eight, or seventy-two hours; the second stage (from the appearance of the rash to its subsidence) from six to eight days, and the third stage (from the disappearance of the rash till the recovery of the patient) from a few days to two or three weeks. Entire duration of the disease from eight days to thirty days, or more.

SEQUELÆ.—Acute desquamative nephritis, with anasarca, and occasionally with other dropsical affections, such as ascites, hydrothorax, hydrocephalus, and hydropericardium. These diseases often follow the mildest attacks. The other sequelæ show themselves mostly after attacks of scarlatina anginosa or maligna. They are the following:—Pain and swelling of the larger joints, with formation of serum, or pus; scrofulous affections; discharge from the nostrils; discharge from the ears, and permanent deafness; suppuration of the glands of the neck; troublesome ulcers of the tongue, pharynx, or epiglottis; croup; inflammation of the eyes and eyelids; inflammatory affections of the internal viscera or of their serous investments; abscess of the testis; mortification of the face, lower extremities, and the pudenda of females; also of portions of the integuments on which the patient has lain; troublesome diarrhœa. Abscess of the brain is a remote result of some cases of scarlatina which have been followed by pain and suppuration of the ear. The membrana tympani and small bones of the ear are destroyed, suppuration is set up in the cancellous tissue of the petrous bone, and necrosis occurs, and the neighbouring veins may become implicated and lead to purulent deposits in the brain, indicated by intolerable pain in the corresponding part of the head, quickly followed by coma, preceded or not by convulsions.

TERMINATIONS.—In complete recovery. In complete recovery after one or more of the foregoing sequelæ. In imperfect recovery, the patient suffering from the effects of one of these sequelæ. In profound coma on the first appearance of the rash and followed by death in twenty-four hours, as if from the effects of a strong narcotic poison; violent delirium during the first five days of the fever. In death on the first, second, or third day, with incessant vomiting, or diarrhœa, or with the two combined. In death at more advanced periods of the disease from exhaustion, or from the effect of any of the several sequelæ.

POST-MORTEM APPEARANCES.—Ulceration and purulent collections in the tonsils, with traces of inflammation extending from the

fauces through the œsophagus, and sometimes through the whole alimentary canal. Congestion or inflammation of the kidneys. Inflammation and swelling of the joints. If the patient die from delirium and coma, great congestion of the vessels of the brain will be found. In such cases we have never observed effusion or the slightest roughening of the membranes. (J. H.)

CAUSES.—*Predisposing.* Infancy and childhood; but no age is exempt.—*Exciting.* A specific contagion.

MORTALITY.—The deaths in London in a million of the population vary from 350 to 2,130, and average 900. The fluctuations from year to year are considerable, and the rate of Mortality in different epidemics has varied in the following proportions: 1, 2, 3, 6, 10, 16, and 25 per cent.

LAWS OF INFECTION.—The disease spreads from person to person, by fomites and through the air; its infecting distance is considerable; it lingers in the same place longer than other infectious diseases; it rarely attacks the same person more than once, but may occur a second and even a third time; it may be communicated by inoculation of the contents of the vesicles which are sometimes blended with the rash; it is thought to be communicable before the appearance of the rash, and for as much as three weeks after its disappearance. It is epidemic in certain seasons, as in 1840, 1844, 1848, 1852, and 1854.

PERIOD OF INCUBATION.—From a few hours, or two or three days, to ten days or a fortnight. It is sometimes stated to be five days.

DIAGNOSIS.—Scarlatina may co-exist with *Enteric fever*. From *measles* it is distinguished by the absence of cough, sneezing, and coryza; by the affection of the throat; by the peculiar appearance of the tongue; by the character of the eruption, its brighter hue, its greater extent, and less-defined form; by the occurrence of the rash in most cases on the second instead of on the fourth day. The great frequency of the pulse and the high temperature of the skin are also highly characteristic of scarlet fever, as are secondary dropsy, affections of the joints, and mortifications. From the greater number of cutaneous disorders by the extent of the eruption, the sore throat, and the fever. A supposed hybrid of scarlet fever and measles has been described under the term *Rötheln*. It is scarlatina *plus* cough, hoarseness, and lachrymation; symptoms which assimilate the disease to measles, but which are due to the presence of scarlatinal eruption on the mucous membranes affected. The eruption on the skin is usually excessive in this form of the disease.

Some cases of scarlatina which soon lapse into profound coma may be mistaken for narcotic poisoning, but the skin in such cases of fever is usually as red as, or even redder than a boiled lobster.

For the distinction between Scarlatina and Diphtheria, see Diphtheria.

PROGNOSIS.—The prognosis in scarlatina must always be regulated by experience of the existing epidemic, as well as by the form which

the disease assumes. The danger is slight in scarlatina simplex, greater in scarlatina anginosa, greatest in scarlatina maligna. *Favourable symptoms.* The concomitant fever purely inflammatory, and slight affection of the throat; remission of the febrile symptoms, and of the affection of the throat, upon the appearance of the eruption; epistaxis; diarrhœa; or other critical discharge. [In one case, I have known all the threatening symptoms pass away, after a profuse discharge of mucus from the nostrils. (G.)] *Unfavourable symptoms.* The eruption being preceded by great anxiety, nausea, and vomiting; the fauces of a dark-red or purple colour, without swelling; ash-coloured or brown specks, soon becoming ulcerated, or terminating in gangrene (*cynanche maligna*); a brown tongue; great prostration of strength; early occurrence of delirium; coma; the fever running high after the period of desquamation; anxious difficulty of breathing, and stridulous voice, indicating the extension of the disease to the larynx and trachea; acute pain in the ear, with deafness and purulent discharge; the saliva tinged with dark blood; acrid discharge from the nose; the skin continuing obstinately dry; the desquamation followed by a fresh efflorescence and increase of fever; a sudden disappearance of the rash, or its assuming a livid hue; mortification; swelling of the joints; dropsical effusions; obstinate vomiting and diarrhœa; inflammation and suppuration of the parotid, submaxillary, salivary, and cervical glands; congestion or inflammation of the brain or lungs. The pregnant, and especially the puerperal state, and teething.

A favourable convalescence may be expected when the pulse falls much below its natural frequency in health; and a marked improvement is generally indicated by a fall of the pulse at night as compared with its frequency in the morning. A frequent pulse continuing when the urgent symptoms have subsided, would lead us to anticipate a lingering convalescence or the occurrence of secondary symptoms. (G.)

TREATMENT OF SCARLATINA.

Of Scarlatina Simplex.

The treatment of scarlatina simplex will consist in keeping the patient in a moderate and equable temperature, about 60° Fahr.; in clean and spacious apartments; enforcing a light diet without animal food; directing cooling acidulated liquors for common drink, and the saline draught as medicine, and keeping the bowels regular by gentle aperients, more particularly towards the decline of the eruption. The treatment may be advantageously commenced with an emetic (Ipecacuanhæ gr. xx.; or Antim. tartarati, gr. i. for the adult), followed by a saline aperient, or by a full dose of castor-oil.

Scarlet fever without eruption may be treated in the same manner.

Of Scarlatina Anginosa.

Indications.—I. To lower febrile action. II. To reduce the inflammation of the throat without exhausting the strength.

I. The first indication is best fulfilled by tartar emetic, in doses of

an eighth, a sixth, or a quarter of a grain, according to the degree of the febrile action. When the heat of the body is great, and persistent, and the skin dry, the patient should be immersed for ten minutes in a hot bath, and saline diaphoretics given.

II. When severe inflammation of the throat is present, with much external tenderness, and great difficulty in swallowing, from six to twelve leeches may be applied to the angle of the jaw, followed by a large warm bread-and-water poultice, and repeated if necessary. In milder cases a bread-and-mustard poultice, or stimulating infusions, applied to the same part, are necessary. A strong solution (5 grs. to ℥i.) of nitrate of silver should be applied twice a day to the inflamed fauces. Acidulated gargles (such as the compound infusion of roses with an excess of acid) may be used to clear the throat. If the discharges from the throat be offensive, gargles of chlorine or permanganate of potash will be required. The following is a very useful form:— Dissolve ℥i* of chlorate of potash in an ounce of water, add f. ʒss. of hydrochloric acid, and afterwards water to f. ʒvi. This gargle may be swallowed. At this stage of the disease the patient's failing strength often requires the use of 4 or 6 oz. of wine daily. The diaphoretics should still be persevered with.

At the decline of the eruption, tonics are required, of which quinine is the best; and a nutritious diet with wine, in moderate quantities. But if the skin continue dry and hot during desquamation, we must induce sweat by the appropriate means. For a full fortnight after desquamation the patient should be kept warm in the house, unless the external air be dry and mild. A sudden chill arrests the action of the skin and leads to congestion of the kidneys. About the time when desquamation sets in a little albumen is generally contained in the urine, and disappears after a day or two. If it persist and increase in quantity, we must resort to the hot bath, and keep the patient in bed.

Of Scarlatina Maligna.

Scarlatina, which assumes at any period of its course the typhous character, is a highly-dangerous disease, and requires the employment of tonics, such as mineral acids, combined with quinine or bark, and stimulants in large and repeated doses, as recommended in typhus fever. When the throat is covered with sloughs, stimulating and disinfecting gargles must be used very often. Strong solution of nitrate of silver should be frequently applied to the throat.

In children, the gargle may be injected into the nostrils, or the nitrate of silver solution may be applied with a brush.

Chlorate of potash (a drachm to a pint of water) has been strongly recommended as a drink in cases of severe scarlet fever. A pint to a pint and a half to be taken in the course of the day. It may be taken with hydrochloric acid in the proportions recommended for the gargle, and in f. ʒss. doses.

When abscesses in the neck, purulent discharge from the ears,

* ℥i = 100 grains.

ophthalmia, pneumonia, cerebral affections, or other diseases, succeed scarlatina, they are to be treated on ordinary principles, according to the severity of the inflammation and the existing state of system. Swelling of the joints is best treated by warm fomentations. Dropsy, following scarlatina, must be treated on general principles. (See Dropsy and Renal Diseases.)

Proper aperients, tonics, nutritious diet, warm clothing, and cautious avoidance of exposure to cold or damp, must be employed and observed after recovery from this disease.

PROPHYLAXIS.—As the disease is highly contagious, the same precautions are required to prevent it from spreading as are recommended in typhus fever (see p. 325). Free ventilation of the sick chamber, the prompt removal of excreta, the placing of all linen removed from the person in boiling water, and strict separation, are the principal means to be adopted during the progress of the disease; the thorough disinfection of the apartment, of the bedding and of its furniture, after the recovery of the patient.

Belladonna, in the dose of one-eightieth of a grain twice a-day, was recommended by Hahnemann as a prophylactic, on account of a property which it has been imagined to possess of producing symptoms analogous to those of scarlet fever. Very small doses of calomel, in combination with sulphuret of antimony, have also been recommended; and Dr. Sims regarded a few grains of rhubarb given every morning as a preventive. These alleged prophylactics are of about equal value. Of belladonna, Dr. Robert Williams says: "There is no evidence to show that belladonna possesses the property attributed to it, or the power of producing scarlet fever, while the cases of exemption after this practice are most questionable." And the inutility of this illogical and unscientific suggestion has been proved by comparative experiments, well devised and carefully carried out by Dr. Balfour, at the Royal Military Asylum at Chelsea.

DIPHTHERIA.

SYNONYM.—Diphtheritis.

DEFINITION.—A contagious and infectious disease, manifested by inflammation of the commencement of the alimentary and respiratory passages, and accompanied by fibrinous exudation.

SYMPTOMS.—The disease invades the system most insidiously, and it may be fully developed when the patient is still unconscious of any affection of the throat. Generally, however, a little stiffness of the neck, soreness of the throat, and slight difficulty of deglutition are complained of, and, on inquiry, we may learn that the patient has been feeling a little weak and out of sorts for two or three days. Sometimes there is considerable constitutional disorder, indicated by chilliness, nausea, and diarrhoea, associated with mental depression and bodily weakness. The skin may be hot and dry, or cool and bathed in perspiration, or natural. The pulse varies accordingly. On examining

the back of the mouth, the isthmus of the fauces and tonsils, altogether or in part, are seen to be swollen and of a dark claret colour, and, sooner or later (in from twelve to forty-eight hours from the commencement of throat affection), a smooth, tough, yellowish-grey, thickish layer of lymph, resembling a piece of wetted felt or washleather, is formed over a portion of the inflamed and dusky surface. Sometimes a tonsil is the primary seat of the exsudation, whence it spreads to other parts. Sometimes the soft palate or one of its arches is the starting-point. But it may first appear on any portion of the mucous membrane contiguous to these parts. Occasionally the exsudation makes its appearance simultaneously at several points. Wherever it appears it tends to enlarge itself, and may spread down the œsophagus into the stomach, or, what is more dangerous still, it may involve the mucous membrane of the larynx, and thence extend along the trachea into the bronchial tubes. In about three days the whole of the inflamed surface is covered over with a thick layer of lymph. If there be any open ulcers on the body of the patient, they are liable to become covered with diphtheritic exsudation. The exsudation is composed of tough fibrinous substance; rarely it is soft and pulpy: it is detached with some difficulty, and when separated, a smooth bleeding surface is exposed, upon which the exsudation re-forms in a few hours. We know that the disease has implicated the larynx by the change in the voice. It is rough and husky, or there may be simply aphonia, and the patient speaks in a whisper. The breathing may suddenly become croupy or stridulous, and so laboured from narrowing of the respiratory orifice, that the face becomes livid, the eyes prominent, the conjunctiva injected, and the supra-sternal and supra-clavicular depressions sucked inwards. Within a few hours from the accession of these symptoms the patient may die suffocated.

In proportion to the extent of the pharyngeal disease there is pain and difficulty in deglutition. In a later stage of the disease pain is absent, for the parts have lost their delicate sensation.

The mucous membrane of the nares participates in the disease, and there is a flux of thin muco-purulent matter like that which appears in bad forms of scarlatina, but so very offensive that the whole atmosphere of the room is tainted by it. The breath has the same putrid odour.

In such grave cases prostration rapidly comes on, and the patient lies on his back apathetic, or insensible and muttering. The heart's action, which had been feeble, though excited, now begins to fail. The face is pallid, the pulse thready, and the patient dies of asthenia.

During the progress of the disease the urine will in a great many cases be found loaded with albumen.

The *duration of the disease* varies from forty-eight hours to fourteen days. Laryngeal symptoms are usually manifested early; and when the disease is fatal from implication of the larynx, the patient dies within the first week. In the absence of laryngeal symptoms, death from asthenia usually occurs during the second week of the disease.

Convalescence commences some time in the second week. It may be deferred to the beginning of the third week.

SEQUELÆ.—Among the most dreaded effects of diphtheria are those which succeed the disease, and these are all attributable to defect or disorder of nervous power. The gravest indication of this condition is feebleness of the heart's action. At a time when convalescence appears to be established, and all things seem to be going on well, the heart is losing force. Stimulants may be freely given, and yet its action is nevertheless noticed to become slower from day to day, until the pulsations are reduced to half their normal number, and the depression still continuing, the patient quietly expires.

Sometimes the whole muscular system partakes of that debility which thus affects the heart: the muscles become too weak to support the body or to move the limbs; the patient cannot use his fingers to button a garment or write a letter. This is called paralysis: it may be more properly termed excessive depression of nerve force.

More frequently the debility only affects the muscles of deglutition and vocalization; the fauces appear to have lost their sensibility; solids may be swallowed without much difficulty, but fluids are returned through the nose. The voice is weak, hoarse, and nasal. In rarer cases the special senses are affected, and blindness or deafness of one or other eye or ear may be present.

Disordered sensation, such as tingling in the hands or feet, is occasionally noticed.

These symptoms of disordered innervation may set in any time after convalescence, and within about six weeks of that event.

CAUSES.—*Predisposing.* Dr. Jenner has the impression that family constitution is one of the most important elements favouring the development of the disease, and that the infection-element does not require for its development any of the ordinarily considered anti-hygienic conditions. *Exciting.* A poison, probably specific, either generated within the body or external to it. It spreads by contagion and infection, and affects persons of young and adult age, but chiefly children. Old people are remarkably free from it. It occurs in epidemics separated by long intervals.

PATHOLOGY.—In death from laryngeal implication, fibrinous exsudations covering the mucous membrane of the larynx, the upper portion or the whole of the trachea, and in some cases the bronchial tubes to their second or third ramifications. My friend, Mr. Southern, of Ludlow, who has had large experience of the disease in a very severe and protracted epidemic in that neighbourhood, informs me that the exsudation involved the whole of the trachea in the fatal cases which he examined. (J. H.) When the larger bronchi are alone affected, we may find the results of acute vesicular emphysema in some portion of the lungs. When the smaller are implicated, there will be pulmonary collapse. Evidence of pre-existing pneumonia is sometimes present.

The œsophagus and parts of the stomach may in the severe pharyngeal form be found reddened and inflamed, or covered with diphtheritic exsudation. The inflamed mucous membrane and submucous tissue is thickened and harder than usual; the soft palate may be in a gan-

grenous condition. The cervical glands are enlarged and hard, and the areolar tissue in which they are imbedded infiltrated with serum. In death from asthenia we may find large fibrinous coagula in the heart or great vessels.

DIAGNOSIS.—*Quinsey* is distinguished by the localization of the disease in the tonsils. We must distinguish between the yellowish spots of excretion from the inflamed gland and fibrinous exsudation. *Common sore throat* is unaccompanied by exsudation, and tends to ulceration. In the earliest stages of the disease the livid inflammatory swelling of the soft palate will in some cases be indicative of the graver of the two diseases. *Croup* is a local disease, restricted almost entirely to childhood. It is unattended with symptoms of inflammation. Malignant *scarlatina* and diphtheria have so many resemblances, and so few differences, that satisfactory evidence of their being distinct diseases is wanting. The chief argument, and it is undoubtedly a strong one, in favour of their distinction, is the fact that diphtheria affords no protection against scarlatina, and the converse.

PROGNOSIS.—In no disease must our prognosis be more guarded. In the early stage of the disease we should offer none. If, after a week, there be no laryngeal symptoms, we may venture to predict convalescence. If the patient possess a robust constitution, he will be less liable to secondary nervous affections. If he be of weakly habit, we must fear their occurrence.

TREATMENT.—*Constitutional.* In the absence of strong febrile symptoms, we must adopt the stimulant plan of treatment from the first. If the pulse be feeble, carbonate of ammonia and bark should be given every four hours, and half a pint of wine or brandy and egg, well diluted, during the twenty-four hours, milk or beef-tea being administered in the intervals.

If the skin be hot, we should give diaphoretics, and it should be maintained in a state of moderate perspiration. If it be cool and clammy, ℞xx.—xxx. of tincture of perchloride of iron in a wineglass-full of water, or a moderate dose of quinine and acid may be given thrice a day. The bowels should be gently opened with ℞ss. or ℞i* of potassio-tartrate of soda, or ℞i of sulphate of magnesia in combination with fʒss. of dilute sulphuric acid.

Local. Hot bread-and-mustard poultices to the throat. The application by means of a sponge or camel-hair brush of strong solution (℞ss. to ʒi.) of nitrate of silver to the inflamed fauces night and morning. Solid nitrate of silver is liable to produce sloughing when applied to the mucous membrane in this low state of inflammation. The occasional use of the acid chlorine gargle recommended in scarlatina (p. 359), or of a solution of perchloride of iron (fʒvi. of the tincture to ʒviii. of water), if gargling can be effected without much distress. If laryngeal symptoms come on, inhalations will give much relief. We may use hot water simply, or a mixture of vinegar and water. If there be not too great depression, a leech may be placed at once over

* ℞i = 100 grains.

either side of the cricoid cartilage. If we have reason to suppose that the exsudation is loosely attached to the mucous membrane of the larynx, we may give an emetic of sulphate of zinc. If suffocation be imminent, we should resort to tracheotomy; it may at least prolong life in many cases, and will be the means of saving it altogether in some few. If the exsudation have affected the lower part of the trachea, little more than palliation can be expected from the operation.

The subsequent depression of vital power must be combated on general principles.

PESTIS—PLAGUE.

DEFINITION.—A contagious fever, generally of the continued type, accompanied by an eruption of buboes, carbuncles, and petechiæ.

SYMPTOMS.—The patient is attacked suddenly, or after slight premonitory symptoms, consisting of rigors, lassitude, depression of spirits, pain and weight of head, and giddiness, with an indescribable feeling of anxiety, and extreme restlessness and severe pain referred to the region of the heart. The countenance is expressive of exhaustion and anxiety, the eye is dull and sleepy, the eyelids closed, the mouth half open. The gait is staggering and uncertain, like that of a drunken man; the debility extreme; the head falls upon the breast; the eyes are dull and sunken, the complexion dingy; there is nausea, or bilious vomiting, often accompanied by diarrhœa; the urine is scanty, high-coloured, and sometimes bloody; the tongue is swollen, furred, and glistening, but moist and clean towards the tip and edges; pulse from 115 to 130, and very feeble; respiration hurried; speech indistinct and faltering. This first stage, which commonly lasts twelve hours, is followed by reaction, with increased restlessness, disturbed sleep, and confusion of thought alternating with coma. The countenance retains its former expression, but the eye assumes a peculiar brightness, and the pupil is dilated. The pulse is hard and full, or very frequent; or weak, fluttering, and intermittent; the tongue is dry, parched, of a yellowish colour, red in the centre and at the edges; then brown, cleft, and horuy; the lips, teeth, and nostrils coated with dry sordes: there is intense thirst, and constant nausea, with occasional vomiting of a blackish fluid; the evacuations from the bowels dark and offensive, and occasionally mixed with grumous blood; and hæmorrhage sometimes takes place from the nose. On the second or third day, but sometimes much later, and sometimes as early as the first day, the characteristic external marks of the disease begin to show themselves. Darting pains in the axillæ, groins, or neck, indicate the commencement of the characteristic glandular swellings and carbuncles. In favourable cases, these swellings are bright-red: in the more dangerous, livid or purple.

In favourable cases, the crisis is by profuse perspiration and suppuration of the tumours, the patient beginning to amend from the sixth

or eighth to the fourteenth or twentieth day. In unfavourable cases, the skin remains harsh and dry; the pulse is small and fluttering; low muttering delirium and laborious breathing set in; the eye is sunk, the countenance wears a ghastly expression; the skin becomes covered with petechiæ and vibices; the buboes remain stationary; the powers of life give way, the patient becomes comatose, and death takes place, commonly on the fourth or fifth day, without a strnggle.

In the most favourable cases, the patient is able to go about his usual avocations, though suffering from the swelling of the glands. In the worst cases, the patient never recovers from the first shock to the nervous system, but sinks within twenty-four hours, or as late as the second or third day, before the buboes have made their appearance.

The plague may be said to assume four degrees of severity: 1. Slight fever, without delirium, or buboes; 2. Fever, delirium, and buboes; 3. Fever, delirium or coma, buboes, carbuncles, and petechiæ; 4. Congestive fever, fatal on the first, second, or third day, before the appearance of buboes. The fever, though usually continued, may assume the intermittent or remittent type.

CAUSES.—*Predisposing.*—Poverty, filth, overcrowding, debility, disease, intemperance, adult age, female sex.

Exciting.—A specific contagion. This is doubted by some authorities, but probably with as much reason as the contagiousness of typhus fever is called in question by others.

LAWS OF INFECTION.—Communicated by contact with the patient, with fomites, or with the dead body. Second attacks rare. Affects the fœtus in utero. Period of incubation, from a few hours to about twenty days. The disease is endemic in Egypt, often spreads to surrounding countries, and formerly prevailed in almost every part of Europe. An analogous disease is believed to exist in some parts of India. In common with other epidemics, plague attacks few persons at first, gradually attains its maximum intensity, and subsides as gradually. The rate of mortality is also greatest at the commencement of the epidemic, and at its first outbreak in each district.

MORTALITY.—At the first outbreak, nine-tenths of the cases, or more; in the decline, a small proportion only of the cases. Throughout an epidemic from one-third to two-thirds, or even four-fifths, of the persons attacked. A third, or nearly one-half of the population of cities attacked by the plague is believed to have perished. In Smyrna, during five months of 1834, out of 5,727 persons attacked, 4,831 died, and 907 recovered: 1 in 23 of the whole population suffered, and about 1 in 27 died; the deaths constituting 84 per cent. of the cases. (See Lib. and Cyclop. Pract. Med., Art. Plague.)

PROGNOSIS.—Highly unfavourable, especially at the outbreak of the disease when the majority of cases end fatally: guarded even in mild cases.—*Favourable symptoms.* The early formation of firm

and moveable buboes passing rapidly into suppuration; profuse perspiration; an absence of severe fever; the survival of the patient beyond eight days.—*Unfavourable symptoms.* Subsidence of the buboes; suppression of urine; hæmaturia; petechiæ; obstinate vomiting; and all the symptoms which would be deemed unfavourable in an attack of continued fever. The puerperal state.

TREATMENT.—That of typhus fever, with appropriate local applications to the buboes and carbuncles, namely, warm poultices to promote suppuration, followed by prompt incisions. Salivation by mercury has been recommended, and, where it has taken place, seems to have been beneficial. The disease appears, however, to be almost equally fatal under all modes of treatment.

PROPHYLAXIS.—Strict separation from patients suffering under the disease, and avoidance of contact with clothing or furniture used by them; and during the prevalence of the malady a strict observance of all the laws of health. In the case of ships from infected places, a quarantine of twenty-one days; and if having cases of plague on board, twenty-one days from the recovery of the last case.

CHAPTER V.

FEBRIS HECTICA	Hectic Fever.
FEBRIS INFANTUM REMITTENS	Infantile Remittent Fever.
PYÆMIA	Pyogenic Fever.
FEBRIS PUERPERALES. . . .	Puerperal Fevers.
CELLULITIS VENENATA . . .	Dissection-wounds.
FARCINOMA	Glanders.

FEBRIS HECTICA—HECTIC FEVER.

DEFINITION.—A remittent fever, arising from local irritation in a weakened constitution.

SYMPTOMS.—Chills, succeeded by flushes, terminating in a hot skin and frequent pulse, and these by perspiration, constitute the paroxysm of hectic fever. There are commonly two such paroxysms or exacerbations in the twenty-four hours. The first generally occurs about noon, and lasts for four or five hours. After a short interval of freedom, a more violent exacerbation follows, which increases in violence till about two o'clock in the morning, when a perspiration, at first partial and then universal, breaks out and resolves the paroxysm.

The pulse during the paroxysms is quick and frequent, ranging from 96 to 130, or even more; the urine is high-coloured, and deposits a pink sediment; the cheeks are coloured with a patchy, circumscribed crimson blush—the hectic flush; there is burning heat in the palms of the hands and soles of the feet. During the remission, the pulse is reduced in frequency, but seldom falls so low as in health. The appetite is not much impaired; and the tongue is clean, moist, and red. The patient rapidly loses flesh.

At length the paroxysms become more violent and the remissions shorter; the appetite fails; colliquative sweats alternate with diarrhœa; and under an increased severity of these symptoms, and of the disease which causes the hectic fever, the patient sinks.

DIAGNOSIS.—From idiopathic remittent fever by the pre-existence of local disease.

PROGNOSIS.—Favourable or unfavourable according to the nature of the local disease, of which the fever is the effect and symptom.

CAUSES.—This fever generally arises from the formation of pus, or its absorption from large surfaces, as in suppuration of the lungs,

liver, hip-joint, &c. But it may arise from any local irritation in weakened constitutions, even when no suppuration exists. The infantile fever which arises from irritation of the alimentary canal is but one form of hectic; and the disease is often present in the early stage of phthisis pulmonalis, before there is any reason to believe that suppuration has taken place. It is in advanced stages of consumption and in extensive suppurative disease of joints that hectic fever is developed in its most characteristic form.

TREATMENT.—This must depend on the disease of which the hectic fever is symptomatic. When there is no apparent disease to produce the hectic symptoms, the treatment must be that of debility, and the sulphate of quina will be the appropriate remedy.

FEBRIS INFANTUM REMITTENS—INFANTILE REMITTENT FEVER.

SYNONYMS.—Infantile gastric remittent—infantile hectic—worm fever—mesenteric fever—stomach fever—low fever of children—marasmus.

DEFINITION.—A non-specific fever due to gastro-intestinal irritation, resulting from retention of fæces, or vitiated condition of the bile or other digestive secretions.

SYMPTOMS.—Pallor, languor, drowsiness, and chilliness in the morning; flushed cheek, hot skin, restlessness, and feverishness towards evening; followed at night by profuse sweating, and towards morning by a distinct remission. Skin dry; tongue moist, but coated; pulse frequent; appetite variable and capricious, or altogether wanting; urine scanty and high-coloured, and depositing a whitish sediment; bowels costive or relaxed, or both alternately; the evacuations slimy and sour-smelling, or highly offensive, dark, green, pitchy, or clay-coloured, or with an abundant secretion of bile; the abdomen tumid and often hot to the touch; the breath offensive; the skin extremely irritable, so that the child is constantly picking the nose, lips, corners of the eyes, fingers, and anus.

In less severe cases, the remittent character of the fever is less strongly marked; the chilliness and languor of the morning, and the febrile exacerbation of the evening being very indistinct, and the child merely looking pale and listless, and losing its appetite. Sometimes the disease becomes chronic, and is marked by paroxysms less intense but of longer duration; the abdomen becomes larger and harder, the tongue more loaded, the constipation generally present in the acute form is changed for a constant and distressing diarrhoea, the patient wastes rapidly, until the plump and rosy features of the child are changed to the meagre aspect of shrivelled old age. The more the child wastes away, the more restless and irritable does it become, till

the last stage of debility arrives, when it dies from exhaustion, in a state of total unconsciousness, or with the mental faculties unimpaired to the very last. The disease may occur at any age, from one or two years up to puberty.

COMPLICATIONS AND TERMINATIONS.—A dry cough, enlargement of the cervical glands; torticollis; porrigo; eczema; strophulus, convulsions. The disease may lead to phthisis, tabes mesenterica, acute hydrocephalus, irritation of the brain, &c.

MORBID APPEARANCES. — Congestion and inflammation of portions of the alimentary canal, especially of the small intestines. Enlargement, induration, or suppuration of the mesenteric glands. Traces of inflammation and its consequences in the brain or lungs.

DIAGNOSIS.—From enteric fever, by the absence of rose-coloured spots, of the fissured tongue, of the ochre-coloured stools, and of hæmorrhage. The older practitioners did not distinguish enteric fever from infantile remittent, and in their accounts of the latter disease we consequently find ulceration of the small intestines noted amongst the morbid appearances. From hydrocephalus, by the absence of coma, strabismus, and convulsions; by the want of distension in the veins of the scalp, and the want (in infants) of prominence in the fontanelles; by the absence of extreme heat of the head, and by the greater frequency of the respiration. In hydrocephalus, too, the bowels are more obstinately confined, and the urine more apt to be suppressed.

PROGNOSIS.—Generally favourable. In the ascertained absence of hydrocephalus, and of extensive disease of the mesenteric glands, the practitioner may safely hold out a prospect of recovery.—*Unfavourable*. When the mesenteric glands are diseased, and when, in spite of appropriate remedies, large quantities of sour, highly-offensive liquid fæces continue to be discharged day by day.

CAUSES.—*Predisposing*.—All causes of debility, such as bad air, want of exercise, confinement within doors, and improper or deficient food.—*Exciting*.—Irritation of the mucous membrane of the intestinal canal by constipation or improper diet; worms (the symptoms in this case are generally less strongly marked); diarrhœa; teething.

TREATMENT.—*Indications*. I. To remove all cause of irritation from the stomach and bowels.

II. To support the patient's strength.

III. To subdue local inflammation and remove local irritation.

I. The first indication is answered by—(a) strict regulation of the diet; (b) the continued use of purgative medicines.

(a) *Diet*.—As long as vomiting or diarrhœa is present, a strict farinaceous diet should be prescribed, or farinaceous food made with milk; as milk-gruel, arrowroot, or sago. In the absence of diarrhœa, rice-milk or bread-pudding; and, in cases of extreme debility, light animal broths or jellies may be prescribed. In young children no

animal food should be allowed. In infants a still stricter diet is often necessary, and the quantity as well as the quality of the food must be carefully regulated. At this early age the stomach is often very irritable, and rejects even the simplest farinaceous food. In such cases a table-spoonful of new milk from the cow should be given every half-hour or hour. If acidity be present, a little lime-water, or carbonate of soda, may be combined with it. This treatment is often very effectual. The stomach wants rest, and the patient wastes because it is not allowed to rest: it rejects food in ordinary quantity, and will bear none in any quantity but that which is natural to it at that early age.

(b) *Purgatives*.—When the bowels are costive, purgatives must be administered day after day, till the patient recovers. As the evacuations improve in character, the symptoms also improve, and when the bowels are restored to their natural state the patient is well; so entirely does the disease depend upon the state of the first passages. Equal quantities of the pulvis rhei and hydr. cum cretâ (five grains of each for a child ten years of age), may be given every night, or every other night, followed the next morning by a full dose of castor-oil. This treatment may be continued for weeks without bad effects, and, in by far the majority of cases, with no fear of salivation. It is not necessary to produce violent action of the bowels; one or two motions a-day will be enough, and hypercatharsis must be carefully avoided. In obstinate constipation calomel may be substituted for the hydr. c. cretâ, and pulvis jalapæ for pulvis rhei. If diarrhœa exist at the outset, it may generally be removed in one or two days by the diet prescribed; but if not, a single grain of hydrargyrum c. cretâ, with three or four grains of the pulvis cretæ comp. c. opio, given three times a-day, will soon succeed in checking it. When the diarrhœa has ceased, but not before, purgatives may be resorted to, and continued every night, or every alternate night, followed by the castor-oil in the morning, until the patient is restored to health.

II. The patient's strength rarely requires support; pure air, proper exercise, and a vegetable and milk diet, are the best restoratives. The proper ventilation of the bed-room or nursery is of the first importance. Should *tonics* appear necessary, the steel wine, in doses of a tea or dessert spoonful three times a-day, according to the age, or quinine in doses of from one to two grains, or the tonic infusions, may be given. But aperients take the precedence of tonics in this disease. The direct treatment of the existing debility by nourishing diet and stimulants, to the neglect of aperients, is a vulgar and often fatal error.

III. If the brain be much affected, the head hot, and the patient very restless, one or two leeches or more, according to the age, may be applied to the temples. But cold lotions to the head will generally suffice to subdue any inflammation that may be present. If the child be teething, the gum-lancet should be freely used; worms will be removed by the common purgatives already recommended; if there should be

any irritation in the lungs, accompanied by mucus in the bronchial tubes, tartar-emetic in doses of one-tenth to one-sixth of a grain may be given according to the age, in combination with one or two grains of hydr. c. cretâ, three or four times a-day. If diarrhœa assume the dysenteric character indicated by mucous and bloody stools, small starch clysters (ʒij.—ʒiv.) with two or three drops of tincture of opium may be used; clysters of gruel may be frequently used. When the belly is hard and tumid, and enlargement of the mesenteric glands is suspected, much good may be derived from repeated friction with the hand or with a flannel moistened with cod-liver oil; if the cervical glands are enlarged, they may be covered with the emplastrum hydrargyri c. ammoniaco, or painted with iodine.

Tubes mesenterica requires the same treatment as the infantile fever, of which it is a frequent consequence. A strict diet, purgatives, if there be no diarrhœa, emollient clysters, frequent frictions to the abdomen, and tonics—when they do not displace these more important remedies—constitute the treatment.

PYÆMIA.

SYNONYMS.—Simple pyogenic fever (Jenner). Septicæmia (Vogel). Ichoræmia (Virchow). Purulent diathesis (Tessier). Suppurative Phlebitis.

DEFINITION.—Severe pyrexia, the result of an altered condition of the blood from admixture with pus or sanious fluid.

SYMPTOMS.—Come on after parturition; the infliction of wounds, or blows, especially of bones; any local inflammation or ulceration; the infectious fevers, &c. They are initiated by severe rigors, followed by intense fever; pulse 100 to 140, full and hard; tongue dry and brown; severe muscular and articular pains; more or less delirium. If the foot have been the seat of operation or injury, deep-seated pain, followed by swelling and tenderness in the muscles of the calf, in the ankle, knee or hip-joints, or in all these parts in succession. There is usually more or less tenderness and swelling in the course of the main veins of the limb, and deep-seated fluctuations may be detected in the neighbouring muscles of the leg and thigh. The fever may now subside, leaving the patient very weak, and liable to hectic; or, as is more usual, the patient sinks into the typhous condition described page 323, and dies comatose. If the purulent infection have spread from the head, severe symptoms of meningitis, encephalitis, and pleuro-pneumonia generally appear at an early stage of the disease. If from the upper extremity, pain and swelling of the muscles of the fore or upper arm, and of the elbow, shoulder and sterno-clavicular joints, accompanied by inflammation of a phlegmonous character, of the corresponding parts of the integument, and followed by deep-seated fluctuation.

Sometimes the disease is still more generally manifested, and all the

large joints of the body become painful, tense, and fluctuating, at a time when the lungs are partially consolidated by inflammatory exudation.

In other and more fortunate cases the disease may be limited to a hand or a foot, where successive abscesses make their appearance.

PATHOLOGY.—If the seat of the exciting cause be the lower extremity, diffuse abscesses in the cellular tissue between the muscles, or in the muscles themselves. Inflammatory swelling and hardening of the areolar tissue around the coats of the main veins leading from the seat of injury, thickening of the coats of the veins themselves—in a word, symptoms of phlebitis. The affected veins are either obstructed with dark, firm coagula, or are filled with pus. A patient had a bit of necrosed bone removed from the fifth metatarsal bone of the left foot, two days afterwards symptoms of pyæmia appeared. He died on the twenty-first day; meanwhile the little wound made by the operation healed completely; the left iliac vein, and the left femoral vein, down to the ham, were filled with creamy pus, and the mouths of their tributaries were plugged with dark, clotted blood; the muscles of the calf were imbedded in a diffuse abscess. (J. H.)

If the intestines be the seat of lesion, inflammation, and numerous minute abscesses may be found in the liver. If the disease have sprung from necrosis of the bones of the internal ear, or from contusion of the bones of the cranium, we shall find the veins of the diploe full of pus; pus and other products of inflammation will be effused between the dura mater and the bone, between or beneath the membranes in the brain substance itself, and very commonly in the lungs. Purulent effusions are commonly found in the pleural and peritoneal sacs.

CAUSE.—1. The generation of pus within the circulatory system. 2. The absorption of pus or sanies from any suppurating surface. Since ulcers occasionally affect the inner surface of the heart and arteries, it follows that pus may be thus directly discharged from them into the blood. Whether the blood itself, in the absence of any external exciting cause, be liable to suppuration, has not been proved; but, on the other hand, we have no proof that it possesses any immunity from spontaneous purulent degeneration. The evidence of such blood disease can never be great, since life must necessarily terminate before any considerable portion of the blood could be thus affected.

With regard to the absorption of pus, this may take place directly, the pus being derived either from the inflamed inner surface of the divided vein, whose open extremity communicates with the suppurating surface, or, in the absence of inflammation, by the capillary action of the empty portion of that vein. In the former case the pus is the result of inflammation of the vein, which, from contiguity, participates in the general inflammation of the part. Such is the simple and obvious cause of pyæmia. A good deal of hazy scientific talk has been employed to disprove not only this cause but the fact of pus in the blood itself. Virchow says, “that nobody has hitherto succeeded in demonstrating by arguments, capable of supporting even gentle criticism, the existence

of a morphological pyæmia.”* But never mind the arguments when the facts prove the point. Pus in the iliac and femoral veins, caused by a wound in the toe, as in the case alluded to, is the completest proof possible of the existence of morphological pyæmia.

White blood cells and pus corpuscles too closely resemble each other to be well distinguished; and, therefore, when white cells are found in abnormal quantity in the blood, we can only distinguish between them by the conditions which have preceded their formation. If the patient have died of anæmia, associated or not with some non-inflammatory disease of the spleen or lymphatic glands, we must attribute the formation of an unusual number of white cells to leukæmia. If pyogenic fever have been present, to pyæmia.

PROGNOSIS.—Generally very *unfavourable* when the disease comes on after amputation or infectious fever; *favourable* in proportion as the fever diminishes, the internal organs escape, and the disease localises itself in the limbs, or muscles and integument of the trunk.

TREATMENT.—*General*;—that recommended for the later stage of typhus fever; we must produce sleep and alleviation of pain by large doses of opium. Quinine with acid may be given in large doses in the early stage of the disease. *Local*;—leeches and cold affusions must be applied to the head if necessary; hot fomentations and poultices to inflamed places; free incisions wherever fluctuation can be detected.

FEBRES PUERPERALES—PUERPERAL FEVERS.

Under this designation authors have described several forms of disease, differing in many of their characters, but agreeing in the general feature of combining a well-marked febrile affection with a local disease varying in seat, character, and intensity. The following distinct forms are recognised by authors.

1. ACUTE PUERPERAL PERITONITIS.
2. ADYNAMIC, OR MALIGNANT PUERPERAL FEVER.
3. PUERPERAL INTESTINAL IRRITATION.
4. FALSE PUERPERAL PERITONITIS.
5. MILK FEVER.

GENERAL REMARKS ON PUERPERAL FEVER.

The diseases which are usually characterised by the term Puerperal Fever, are the first two of the present group—*acute puerperal peritonitis*, and *adynamic or malignant puerperal fever*. Both these diseases have been observed in different epidemics; and cases of both forms occur in the same epidemic. These two forms, and all their varieties, have their origin in the same cause, and that cause is *uterine*

* “Cellular Pathology” translated by Chance, p. 195.

phlebitis, the result most probably of the passage of sanious or purulent fluid from the uterine cavity into the uterine circulation. If the uterus remain large and tender, and the discharges offensive, we may apprehend the accession of puerperal fever in some form or other. The local lesions of puerperal fever involve one or all of the organs of gestation. Most commonly the disease spreads from the peritoneal covering of the uterus. In other cases, its muscular walls are the seat of abscess, softening, and gangrene. In others, the living membrane is softened and gangrenous, and the open mouths of the veins exude putrid sanies. The veins and lymphatics are inflamed, and either blocked up with clots or distended with pus. Diffuse pelvic cellulitis, resulting in large purulent collections, is not uncommon. Inflammation and suppuration of the ovaries are amongst the other local lesions. Purulent deposits in the muscles, joints, and phlegmasia dolens, are the secondary affections arising from these grave local lesions.

There can be no doubt that some local lesion, slight in some few instances, it may be, will be found on careful examination in every case of death from puerperal fever, and to this we shall reasonably enough attribute the fever. But some observers hold a different opinion, viz., that there is a specific poison which generates the fever, and that the local lesions are secondary results of this fever. Puerperal fever is indeed highly contagious, and repeated experience has proved that a practitioner may, after the strictest precautions, carry the disease from patient to patient in uninterrupted succession. The experience of lying-in hospitals is also corroborative of the highly contagious, if not infectious nature of puerperal fever. At first sight we may hence conclude that there is indeed a *specific* poison: but further experience dissuades from this view, for it has been observed that the common post-mortem poison and erysipelas will in like manner produce puerperal fever. The true explanation appears to be this; that just as diastase will bring about an immediate conversion of starch into sugar, so will a particular condition of the animal fluids induce a suppurative change in the tissues. While this theory will serve to account for the production of puerperal fever, it will be useful in indicating the precautions which medical practitioners should use in attending parturient women. They must avoid contact with erysipelas, post-mortem fluids, and putrid discharges of all kinds; and if they have been obliged to handle them, the hands should be washed several times in a running stream, and several times soaked in a solution of kreasote or carbolic acid. (J. H.)

ACUTE PUERPERAL PERITONITIS.

SYMPTOMS.—Severe rigor, commencing on the second, third, or fourth day after delivery, and in some cases much later; followed by acute pain in the abdomen, and generally in the hypogastric region: the

uterus is enlarged, and very tender. The pain is constant, augmented at intervals, increased by pressure, and by motion, and accompanied by fulness and tension of the abdomen. The secretions, especially the milk and lochia, are checked, if the latter continue it is very offensive; the skin is hot; the pulse sometimes frequent, small, and wiry, at others full and bounding, the tongue furred. There is headache, restlessness, and sleeplessness, with pinched, anxious, and suffused countenance, occasional vomiting, and hurried respiration. In unfavourable cases, the pain and tension of the abdomen increase, and it feels hard and tympanitic; the pulse becomes more and more rapid, the skin cold and clammy, the head first feels confused, and then muttering delirium follows; the tongue becomes dry and brown, the teeth covered with sordes; distressing eructation and vomiting, hiccough, subsultus tendinum, facies hippocratica, and cold extremities, usher in the fatal result.

MORBID APPEARANCES.—Redness of the peritoneum, especially of that covering the uterus and its appendages, with more or less effusion of solid lymph and serum into its cavity. The uterus, ovaries, and Fallopian tubes covered with a creamy matter. Purulent deposits sometimes found in the muscular structure of the uterus; ovaries often disorganised by abscess.

CAUSES.—Contagion. The common causes of inflammation. It is often epidemic, and coexists with or precedes the malignant variety.

PROGNOSIS.—*Favourable*, but guarded, if the treatment be commenced early, and if the reigning epidemic be of a mild character.

TREATMENT.—*Indications.* 1. To reduce inflammatory action; II. To remove local irritation.

I. Prompt treatment is required.—Leeches in large numbers to the abdomen, according to the severity of the symptoms and the strength of the patient; and to be repeated if necessary; hot fomentations to the abdomen; calomel in doses of half a grain, in combination with half a grain of opium, or with five grains of Dover's powder, every two, three, or four hours, continued till the constitutional effects of mercury are produced. Cooling drinks and cool air. When there is much debility, nourishing food and stimulants, as wine, brandy, and ammonia, or turpentine, taken by the mouth, and in the form of injection.

II. The uterine cavity should be thoroughly washed out with warm water containing $\frac{1}{20}$ part of solution of chloride of lime or permanganate of potash. A purgative of castor-oil, or salts and senna, to be administered at the outset, and to be followed up at short intervals, so as to keep the bowels open.

If swelling, tension, and tenderness of the abdomen continue after the antiphlogistic remedies have been carried to their full extent, a blister may be applied to the abdomen, and dressed with mercurial ointment, or the abdomen may be fomented with hot turpentine.

ADYNAMIC, OR MALIGNANT PUERPERAL FEVER.

SYNONYMS.—Puerperal hysteritis or metritis.

SYMPTOMS.—More obscure than the foregoing: the rigor less strongly marked, the pain in the abdomen less severe, little increased by pressure, deep-seated, more circumscribed, and often limited to the hypogastric or iliac regions. The pulse, from the first, extremely small, rapid, and weak, ranging from 130 to 160; countenance anxious and sunk, skin of a livid yellow tinge; extreme restlessness; intellect, though sometimes clear to the last, generally wandering; low, muttering delirium; tongue at first white, then dirty yellow, then dry and brown; if blood be taken, its colour is found to be dark, and the coagulum very loose; eructation, vomiting, hiccough, diarrhoea; the evacuations highly offensive; lochial discharges fetid and often suppressed; breasts flaccid; abdomen tumid and tympanitic; uterus large, uncontracted, tender. Death after the usual typhous symptoms, or slow recovery.

MORBID APPEARANCES.—Peritoneum of a dusky colour, the effused fluid dirty brown, often bloody and very glutinous, and mixed with shreds of lymph. Fetid gas in the intestines. Uterus disorganised, softened, or gangrenous; ovaries broken down and reduced to a pulp. Pus in the veins of the uterus, and in the joints; inflammation, and abscess of the cellular membrane of the leg, &c. In a word, evidences of pyæmia.

CAUSE.—Uterine phlebitis. Contagion.

PROGNOSIS.—*Unfavourable* in all cases; chances of recovery slight.

TREATMENT.—*Indications.* I. To remove local irritation. II. To support the patient's strength. III. To reduce local inflammation at the least sacrifice of strength.

I. The source of the mischief lies in the uterus, and we must attack it there by repeatedly washing out the offensive discharges by warm disinfecting fluids. The condition of the uterus should be carefully regarded for the first few days after delivery, and if it remain large and tender, and the discharges become offensive, we should lose no time in clearing out the disorganized clots which give rise to the foetid discharge, and the absorption of which is poisoning the blood. Calomel, in doses of from three to five grains, every two or three hours, with half a grain or a grain of opium.

II. Nourishing diet, wine, ammonia, spirituous stimulants, or oil of turpentine; and the treatment proper to the typhous form of fever.

III. Hot fomentations, hot turpentine, or blisters to the abdomen. The bowels to be kept open by occasional doses of castor-oil, and warm water to be injected, from time to time, into the rectum.

PUERPERAL INTESTINAL IRRITATION.

SYMPTOMS.—General uneasiness, coming on at any period after delivery, if the bowels have been neglected; loss of appetite; tongue furred; chills alternating with flushes; headache; frequent pulse; abdomen large and rather tense; slight, deep-seated pain, relieved by steady pressure; nausea and vomiting of a dark and offensive fluid; diarrhœa; evacuations dark, fœtid, watery, or slimy; flatulence; fœtor of breath. In unfavourable cases, the exacerbations of fever become more severe and of longer duration, and are attended with extreme debility and despondency; there is the red tongue of acute gastric irritation; the mucous membrane of the tongue and mouth is often covered with aphthæ. The diarrhœa continuing and the strength diminishing, the febrile symptoms become more constant and severe, and the disease gradually assumes the shape of the malignant puerperal fever.

MORBID APPEARANCES.—Generally none. Sometimes inflammation, with or without ulceration, of the mucons membrane of the intestines.

PROGNOSIS.—Generally favourable, if promptly treated; unfavourable if neglected.

TREATMENT.—*Indications.* I. To remove the offending matter from the bowels. II. To support the strength.

I. The first indication is met by a full dose of calomel and opium, followed, after two or three hours, by castor-oil or the senna draught. The effect on the bowels may be kept up by calomel in doses of from three to five grains every three or four hours, and enemata of warm water may be administered from time to time.

II. The second indication is fulfilled by the usual tonic or stimulating remedies, and nourishing diet.

If the disease run into either of the foregoing, the remedies appropriate to that form of the disease must be employed.

PUERPERAL PERITONEAL IRRITATION.

SYMPTOMS.—After a slight rigor, pain and tenderness of the abdomen, a slightly-coated tongue, a rapid and very compressible pulse; temperature of the skin little increased; expression of the countenance free from anxiety; strength not much impaired. It is most apt to occur in delicate and nervous females, after unusually severe after-pains, or from the violent operation of a purgative. Profuse perspiration and diarrhœa are present in some cases.

PROGNOSIS.—Favourable.

DIAGNOSIS.—From true puerperal peritonitis by the milder character of the symptoms.

TREATMENT.—Fomentations, poultices, diaphoretics, and opiates, with an occasional mild laxative. Ten grains of Dover's powder, or from 20 to 30 drops of laudanum, may be given at once, and repeated at certain intervals if necessary.

MILK FEVER.

SYMPTOMS.—After well-marked rigor, occurring about the third day after delivery, followed by a hot and then a sweating stage; great pain and throbbing in the head; intolerance of light and sound; flushed countenance; contracted pupils; conjunctiva injected; pulse frequent, full, and hard; skin hot and dry; thirst excessive; tongue dry and coated; breasts hot, tense, and painful. If speedy relief be not obtained, the head symptoms become more severe, and may be attended by slight delirium; the breasts become hard and more painful, and the operation of suckling cannot be borne, and, after an increase of the general pyrexia, it subsides into a local inflammation, and an abscess of the breasts is the result.

CAUSES.—Accumulation and retention of the lacteal secretion from want of early suckling, hyperæmia, &c.

DIAGNOSIS.—From other puerperal fevers by the presence of the local cause.

TREATMENT.—Free saline purgation, by which the tension of the breast will be much relieved. The breasts should be kept cool by means of an evaporating lotion, or they may be gently rubbed with a little spirit and water. As soon as the tenderness has sufficiently diminished, the infant or a breast-pump should be applied to the nipples.

If we fail to subdue the congestion of the breast, we should apply a few leeches and use the ordinary means for preventing a mammary abscess.

CELLULITIS VENENATA—DISSECTION WOUNDS.

DEFINITION.—Inflammation of the cellular tissue, accompanied by severe febrile symptoms, produced by a poison contained in certain dead bodies, and absorbed from wounds.

The wound may be received in the act of dissecting, or it may exist previously; but in some cases no wound or injury of any kind has been discovered.

SYMPTOMS.—In the greater number of cases the disease sets in, within a few hours of the receipt of the injury, with inflammation at the seat of the puncture; but in rare instances the local affection is preceded by febrile symptoms, ushered in by severe rigors. The inflammation commencing in the puncture first affects the hand, then gradually extends up the arm till it reaches the axilla, whence it some

times extends to the trunk, and even to the lower extremity. It is accompanied by swelling, tension, and throbbing pain in the parts affected; the course of the absorbent vessels is often indicated by dusky red lines, or by an erythematous blush, with irregular defined outline, and the absorbent glands above the elbow and in the axilla are swelled and painful. The inflamed parts are at first exquisitely painful, but become less sensitive as the disease advances. In favourable cases the inflammation terminates in serous effusion, which is gradually absorbed. In more severe cases suppuration of the cellular tissue, both superficial and deep seated, occurs, and abscesses form under the theca of the punctured finger, or diffused abscess attacks the cellular membrane on the hand and arm, or even on the trunk of the body. When the inflammation runs very high, it sometimes terminates in extensive sloughs. In some of the least favourable cases the local affection is very slight. The punctured part becomes the seat of a small vesicle or pustule, and the inflammation at once attacks the axillary glands; the neck and upper part of the chest are swollen, stiff, and painful; and the inflammation sometimes extends over the trunk till it even reaches the lower extremities. Occasionally deep-seated diffused abscesses form without any superficial inflammation. The local affections are accompanied by febrile symptoms, generally of the typhous type, with profuse foetid sweats, great debility, extreme depression of spirits, and high nervous excitement. The mind is generally unaffected; but the patient sleeps little, and is sometimes delirious at night. Recovery is often slow and imperfect, the hand remaining stiff in consequence of the slow absorption of effused fluids, the thickening of the textures, or the injury attending on suppuration or gangrene of the parts. The general health is also regained but slowly.

CAUSES.—*Predisposing.*—Debility, from whatever cause; cachexia. *Exciting.*—A contagious matter absorbed, in most instances, from a sore or wound on the hand, in persons handling dead animal matter.

LAWS OF INFECTION.—The contagious matter seems to be most active in bodies recently dead, especially if the death have been caused by peritonitis, puerperal fever, or erysipelas. The period of incubation is very short—from a few hours to a few days.

DIAGNOSIS.—The diagnosis is difficult in those rare cases in which no punctured wound or other injury can be discovered. The acute sensibility of the inflamed parts is very characteristic.

PROGNOSIS.—The mortality in the more severe class of cases is about 50 per cent. *Favourable symptoms.*—The inflammation limited to the fore-arm; well-marked phlegmonous inflammation; acute abscess; early suppuration of the glands of the axilla. *Unfavourable symptoms.*—Indolent inflammation; diffused chronic abscess; gangrene; extension of the inflammation beyond the axilla; the axilla attacked without intervening inflammation of the fore-arm and arm; acute pain, and great nervous excitement.

TREATMENT.—*Indications.*—1. To subdue inflammation, or promote healthy suppuration in the inflamed parts, and the free discharge of matter when formed. 2. To support the patient's strength. 3. To soothe pain and allay nervous excitement.

1. When local inflammation runs high, leeches may be applied to the inflamed part, followed by warm fomentations, unless cold applications should prove more grateful to the patient. When suppuration is taking place, warm poultices, or rags dipped in warm water and covered with oil-cloth, should be kept constantly applied. When matter has formed, it should be discharged by free and deep incisions.

2. The patient's strength will generally require to be supported by stimulants, such as ammonia and æther, with a liberal supply of wine and a nourishing diet.

3. The third indication is fulfilled by keeping the patient under the influence of opium. When the patient suffers from acute pain and great excitement, full doses of opium or of its preparations should be given; such as half a drachm of tincture of opium, or half a grain of muriate of morphia. The effect of the opiate should be watched, and, if favourable, the dose should be repeated every two, three, or four hours. The opiate may be combined with ammonia or æther when the symptoms assume the typhous character.

The rest of the treatment will consist in the occasional administration of aperient medicines, to keep up a free action of the bowels.

PROPHYLAXIS.—Wounds received in dissection, especially of bodies recently dead, should be immediately attended to, especially if the operator is not in good health. The hand should be washed, and the wounded finger or part be kept in the mouth, moistened by saliva, and submitted to suction. On the appearance of the least inflammation a poultice should be resorted to. The application of caustic to the wound may do good if applied at once to the bottom of the puncture.

FARCINOMA—GLANDERS—FARCY.

SYNONYM.—Equinia.

DEFINITION.—A contagious malady, characterised by inflammation of the nasal mucous membrane, and by inflammatory tumours and pustules in different parts of the body, caused by contact with the horse or other quadruped affected by glanders, or with persons suffering from the same disease.

VARIETIES.—1. Acute glanders. 2. Chronic glanders.

1. *Acute Glanders.*

SYMPTOMS.—The disease generally sets in with pain in the head, back, and limbs, rigors, nausea, thirst, great prostration of strength, and stiffness and pain in the joints, increased by motion. These symptoms are followed, after a short but variable interval, by tumours, red, painful, and tender, in different parts of the body, ter-

minating in abscesses discharging a foetid sanies, and passing quickly into a state of gangrene. From the fourth to the sixteenth day, in the greater number of cases, a profuse discharge of a yellow or sanious fluid from the nostrils sets in, accompanied by redness, heat, swelling, and excoriation of the nose, lips, and cheeks; the eyes are inflamed, and the eyelids swollen. Pustules and black bullæ appear on the face, trunk, limbs, and parts of generation. These local symptoms are accompanied by a hot skin, urgent thirst, frequent, weak, and irregular pulse, and feeble respiration. The tongue is covered with a dark fur; the skin is bathed in a profuse and offensive perspiration; the evacuations are slimy and foetid. These symptoms increase in severity, and are followed, after a few days, by diffused abscesses in different parts of the body, especially about the joints; typhous symptoms rapidly supervene; the nose and lips become gangrenous; the discharges extremely offensive; low muttering delirium sets in, and death takes place by collapse. The greater number of patients die within a fortnight, but a few survive till the third or fourth week, and one death is reported at the end of more than two months.

ANATOMICAL CHARACTERS.—Besides the pustules and tumours on the surface, congestion of the mucous membrane of the nose, fauces, air-passages, and alimentary canal; congestion of the lungs; phlebitis; purulent deposits in the lungs and joints; diffused abscess in the cellular membrane; and sero-sanguinolent fluids in the serous cavities.

CAUSES.—Contagion and infection. The disease originates in quadrupeds from over-work, privation, or overcrowding, and is most commonly communicated from the horse to the human subject.

DIAGNOSIS.—This presents no difficulty. The peculiar discharge from the nostrils, the seat and character of the pustules, the history of the case, and the occupation of the patient, prevent it from being confounded with any other disease. Farcy is distinguished from glanders by the absence of the peculiar discharge from the nostrils. But the two terms, Glanders and Farcy, are not used with much discrimination, at least in the human subject. Farcy, as it occurs in the horse, is distinguished as *button-farcy* and *bud-farcy*, according as the tumours attack the cellular tissue in common with the lymphatic glands, or the lymphatic glands only.

PROGNOSIS.—In acute glanders highly unfavourable. The disease is generally and speedily fatal. In chronic glanders more favourable. In farcy still more favourable.

TREATMENT.—No remedy has yet been discovered. The treatment must be that of typhus fever. The treatment of the local inflammation the same as in cases of dissection-wound.

PROPHYLAXIS.—Those who are employed in grooming horses affected by glanders should wear gloves, avoid contact with the

diseased animal, and practise scrupulous cleanliness. Wounds or sores in grooms should, like dissection-wounds, be promptly treated by suction. Stables in which glandered horses have been kept should be thoroughly cleaned and fumigated, scraped and whitewashed, and harness and horsecloths either destroyed or exposed to a high temperature, and thoroughly washed.

2. *Chronic Glanders*.—In this form of the disease the local symptoms precede the febrile excitement, and the course of the malady more nearly resembles the effects of a dissection-wound. After a few hours from the introduction of the poison, the lymphatics of the wounded part become inflamed, and the inflammation extends along the fore-arm and arm to the axilla. The parotid and submaxillary glands may also be swollen and inflamed. Extensive abscesses form in the cellular tissue of the limb, and, in fatal cases, the pustular eruption, accompanied by dark bullæ, appears on the skin, followed by well-marked hectic fever. The duration of the fever is often very considerable, both in favourable and in fatal cases.

The term chronic glanders is used as synonymous with acute farcy, chronic farcy being a still milder and more protracted disease.

CHAPTER VI.

SCROFULA	King's Evil.
RACHITIS	Rickets.
MOLLITIES OSSIIUM. . . .	Softening of the bones.
PURPURA	Scurvy.
RHEUMATISMUS.	Rheumatism.
PODAGRA	Gout.

SCROFULA—KING'S EVIL.

SYNONYM.—Struma.

DEFINITION.—A peculiar state of constitution, characterised by want of power and tone, the deposit of *tubercle* in several organs of the body, and a tendency to indolent inflammatory swellings and chronic ulcers.

The most common forms of scrofulous disease are, chronic inflammation and suppuration of the glands of the neck, strumous ophthalmia, and chronic ulcers of the cornea, porriginous diseases of the scalp, pustular eruptions about the ears and mouth, indolent abscesses of the skin, chilblains, enlarged tonsils, mollities ossium, diseases of the bones and joints, psoas abscess, tabes mesenterica, and pulmonary consumption. The scrofulous, too, are more subject than others to hysteria and to mental disorders.

The form of scrofula to be described in this place is that which attacks the absorbent glands of the neck. Other scrofulous affections will be treated of elsewhere in these pages (see Rachitis, Tabes Mesenterica, Phthisis Pulmonalis, and Strumous Ophthalmia), or in works on Surgery to which they properly belong.

SYMPTOMS.—Scrofula most commonly affects children of a lax habit of body, with a smooth soft skin, delicate rosy complexion, fair and fine hair, large blue eyes, with long silky eyelashes, full upper lip, and tumid septum and alæ nasi. A less common combination is the dark hair and olive complexion. It is also apt to attack spare, pale children, with projecting foreheads, misshapen heads, narrow and deformed chests, swollen fingers, enlarged joints, irregular and unsound teeth, and tumid abdomens. The most constant mark of the scrofulous diathesis is the thick upper lip. In addition to these marks of the scrofulous diathesis, may be mentioned a languid circulation, a slow and weak pulse, cold extremities, and great liability

to chilblains. A weak digestion, variable appetite, and torpid, or disordered bowels are also of frequent occurrence in scrofulous children. The subjects of this disease often display great acuteness and aptitude, with lively imaginations, and ardent affections, and not unfrequently a great precocity of intellect.

The scrofulous affection of the glands of the neck first appears as a slight swelling of one or more of the glands of one or both sides of the neck, especially of those situate beneath the lower jaw. The tumour is even to the touch, moveable, not tender, nor marked by any inflammation of the skin. Sometimes the swollen gland or glands will remain in this state without perceptible change for weeks, months, or even years; sometimes they undergo a very gradual enlargement; sometimes they coalesce, so as to form irregular knotty swellings; sometimes, under proper treatment, or even without interference, they gradually disappear. In a large proportion of cases they proceed to suppuration. The glands increase in size; the skin covering them, and the cellular membrane surrounding them, become thickened and inflamed; so that they grow less moveable, and more tender to the touch. At length the tumour points, fluctuation is perceived, and unless relief be given by the knife, discharges through a single opening, or by several small apertures, pus, followed by a sero-purulent, mixed with a curdy or cheesy matter. The abscess thus formed heals slowly, has an unhealthy appearance, a dull-red colour, with hard, swollen, irregular edges, and an uneven base, clogged with curdy matter. When the ulcer heals, it leaves an irregular and unsightly scar. Though the superficial absorbent glands of the neck are those most frequently attacked, the deeper-seated glands are often implicated; and the disease sometimes spreads along the course of the absorbents from one gland to another.

The constitutional disturbance which accompanies these local changes is often slight. The patient retains his colour, does not lose flesh, and has every appearance of good health. In other cases, the departure from health is slight, consisting in general languor, some emaciation, defective or uncertain appetite, cold extremities, and languid circulation. When the local disease, however, is very extensive, and the glands suppurate, hectic fever sets in, with great debility and emaciation. In advanced stages of the disease, especially in young adults, pulmonary consumption may supervene; and the two diseases then run on together until they destroy the patient.

CAUSES.—*Predisposing.* Hereditary taint; syphilis or gout, or a shattered constitution in one or other of the parents; disparity of age in the parents, or too near relationship; childhood, youth, and the early adult age. The disease is of most common occurrence between the third and seventh year; it is comparatively rare after puberty, but may occur as late as thirty years of age. *Exciting.*—All causes of debility acting on the predisposed—such as sedentary habits of life; scanty and unwholesome food; the impure air of crowded and ill-ventilated nurseries, schools, workshops, and factories, and the confined

rooms inhabited by the poorer classes in towns; want of cleanliness; over-work; bad water; damp and low situations; the seasons of winter and spring; exhausting maladies, especially fever and the febrile exanthemata. The immediate exciting cause is often an attack of catarrh. The disease is common among prisoners.

DIAGNOSIS.—From simple glandular inflammation, by the indolent character of the swellings. From malignant diseases of the same parts, by the appearances just described, and by the early age at which scrofula sets in.

PROGNOSIS.—The disease, when limited to the absorbent glands, is rarely fatal, but other scrofulous affections, such as tabes mesenterica in childhood, white swelling of the joints, disease of the spine, and pulmonary consumption in the young adult, are dangerous and fatal maladies. Scrofula is always slow and tedious in its course, and very uncertain in its duration.

POST-MORTEM APPEARANCES.—The glands themselves contain a soft curdy matter. The other viscera of the body, especially the mesenteric glands and the lungs, contain tubercular deposits. Scrofulous disease of the joints and bones is also of common occurrence.

TREATMENT.—*Indications.* I. To improve the general health. II. To promote the absorption or dispersion of local tumours, and the healing of ulcers.

I. The first indication may be fulfilled by—

A nutritious diet, adapted to the age of the patient, with a due allowance of animal food. During the stage of suppuration, a more generous diet will be necessary, and wine and malt liquors in moderate quantity may be given with advantage. In scrofulous infants brought up by hand, the substitution of the mother's milk, or of pure milk from the ass or cow.

Daily exercise, short of fatigue.

Warm clothing (flannel next the skin, avoiding over-clothing).

Change of air, especially from a low, damp situation to a high, dry, and bracing air. Sea-air and sea-bathing in the summer and autumn months.

A cold or tepid bath daily, followed by friction with a rough towel, or the shower-bath once or twice a-week, and an occasional warm bath, to insure perfect cleanliness, and an open state of the pores of the skin.

The state of the bowels must be carefully attended to, and gentle aperients must be administered at short intervals. A few grains of rhubarb, with small doses of hyd. c. cretâ may be given every night, or every other night, followed by a tea or dessert spoonful of castor-oil the following morning.

If the patient suffer from heartburn and other symptoms of indigestion, the aperients may be combined with alkalis, such as the carbonates of magnesia or soda; or the liq. potassæ may be given in any of the tonic infusions.

Tonics, of which the preparations of iron are to be preferred, especially when the patient is habitually pale and languid. The vinum

ferri, the tinctura ferri sesquichloridi, the ammonio-chloride, the citrate and ammonio-citrate, and the dried sulphate, are suitable preparations. Decoction of bark, or quinine, may also be given, or quinine and iron in combination.

Iodine in the form of iodide of potassium (one to three grains three times a-day in some tonic infusion), or the same in combination with some of the liquid preparations of iron, or the iodide of iron in doses of from one to five grains, three or four times a-day.

Cod-liver oil (a tea-spoonful three times a-day, gradually increased to a table-spoonful) is a valuable remedy in scrofula.

Occasional symptoms must be met by appropriate remedies in smaller doses than in patients of more robust constitution. As a general rule, general and local abstractions of blood, and all lowering measures must be carefully avoided; but leeches in small numbers may be occasionally necessary in that condition of the swellings in which there is reason to hope that by keeping down the inflammation of the skin, suppuration may be prevented.

II. Simple enlargement of the glands of the neck may be treated by the constant application of the emplastrum ammoniaci c. hydrargyro, or they may be painted frequently with iodine paint. (Iodine $\mathfrak{Dss}$,* iodide of potassium grs. xl., rectified spirits of wine $\mathfrak{f}\mathfrak{z}\mathfrak{i}$.) If the patient be at the sea-side, poultices of sea-weed (the fucus vesiculosus) may be kept constantly applied. When suppuration takes place, it must be encouraged by poultices, and the matter be let out by a small vertical or oblique incision. Caustic should never be used for this purpose, as it leaves behind it unsightly scars.

Open scrofulous ulcers generally put on an indolent character, and must be treated by local stimulants, and in extreme cases by caustics. In the treatment of other local affections occurring in scrofulous habits this peculiarly indolent character must be borne in mind.

REMEDIES.—*Mercurial preparations, given as alteratives*, such as Plummer's pill, or the bichloride of mercury with sarsaparilla (Hydrarg. bichloridi, gr. $\frac{1}{20}$; decoct. sarsæ $\mathfrak{f}\mathfrak{z}\mathfrak{ss}$., or syrupi sarsæ $\mathfrak{z}\mathfrak{i}$. three times a-day). *Medicines containing iodine in small quantities*; of which the one most in repute is the burnt sponge in doses of grs. xxx. to $\mathfrak{Dss}$. *Alkalies and alkaline earths*, of which the best is the liquor potassæ, in doses of from five to twenty drops, three times a-day in some tonic infusion; or lime-water in doses of from one to two drachms. *The mineral acids*, especially the nitro-muriatic acid. *The chlorides of Barium and of Calcium*. (Liquor barii chloridi. $\mathfrak{m}\mathfrak{i}\mathfrak{i}\mathfrak{i}$. to $\mathfrak{m}\mathfrak{v}$, cautiously increased; or Liquor calcii chloridi, $\mathfrak{m}\mathfrak{x}\mathfrak{x}\mathfrak{x}$. to $\mathfrak{m}\mathfrak{x}\mathfrak{l}$. gradually increased.) *Extract of Conium*.

From the slow progress and uncertain march of scrofulous affections, many remedies seem to be serviceable which are really inert. In this respect scrofula resembles pulmonary consumption. The most opposite remedies are confidently recommended and thought to be efficacious.

* $\mathfrak{z}\mathfrak{i}$ = 100 grains.

RACHITIS—RICKETS.

DEFINITION.—A distortion of the bones, occurring in infancy and childhood, from a deficiency of earthy matters.

SYMPTOMS.—The disease sometimes begins soon after birth; more frequently when the child is five or six months old; more frequently still before the close of the second year. After this time it is very rare. When the disease first sets in, the child is observed to be less healthy and strong than children of the same age. The face is pale, and the body emaciated. Teething begins late, and goes on slowly, and the teeth soon become loose and carious. The fontanelles and sutures are usually open, the head, though smaller than usual, is generally large in proportion to the face, and the forehead prominent; the chest is flattened at the sides, and the sternum projecting, the epiphyses of the long bones become spongy, and the joints swell. This enlargement of the joints is commonly first perceived in the wrists and ankles. As the disease advances, the long bones yield to the weight of the body, and are twisted by the action of the muscles; the spine becomes curved and bent; and the pelvis is distorted and narrowed. If the patient have begun to walk, his gait is unsteady and waddling. The mental faculties, except in cases of cretinism, of which distortion of the bones forms a part, are unimpaired, and even more acute than in children of the same age.

CAUSES.—*Predisposing.* Hereditary predisposition. A peculiar diathesis, allied, perhaps, to the scrofulous, but not identical with it; for neither enlargements of the cervical glands, nor tuberculous deposits in the lungs, are of common occurrence in rickety subjects. *Exciting.*—Bad nursing, bad food, bad air, want of cleanliness.

PATHOLOGY.—Defective nourishment, or mal-assimilation of the

Fig. 45.



food, leading to a deficiency of earthy matter in the structure of the bones. Dr. J. Davy found 100 parts of the dry tibia of a rickety child to be composed of 74 parts of animal matter and only 26 of earthy salts. The microscopic appearance of rachitic bone is very characteristic. Ossification is observed to have taken place so partially and imperfectly that the bone is made up of isolated and apparently independent masses of unaltered cartilage, and of completely and incompletely formed bone promiscuously distributed. Owing to the imperfect ossification of the matrix, the conversion of the enlarged cartilage cells into lacunæ is readily seen, fig. 45.

PROGNOSIS AND RESULTS.—*Favourable.* The disease is very rarely fatal. In mild cases complete recovery often takes place; the swollen joints gradually returning to their natural size: in severe cases the distortion of the body is permanent, but the bones ultimately resume their normal composition, and even become more dense and compact than in persons originally healthy. Distortion of the pelvis causing obstruction to parturition is the only result which endangers life.

TREATMENT.—*Indications.* 1. To preserve and improve the general health. 2. To supply the deficient earthy constituents of bone. 3. To support the weak and distorted limbs.

1. The first indication is fulfilled by food of good quality and adapted to the child's age; by substituting the mother's milk, or new milk from the cow, for other food, in infants brought up by hand; by fresh and pure air, cleanliness, exercise in the open air, cold or tepid salt-bathing, and frequent frictions. Also by tonics, especially preparations of iron, such as steel-wine, in doses of a tea or dessert spoonful, three or four times a-day, or the sulphate or potassio-tartrate of iron. Cod-liver oil in doses of from a tea-spoonful to a table-spoonful three times a-day, may also be prescribed with advantage. Children living in large towns should be removed to the country. The state of the bowels should be carefully attended to.

2. The second indication is fulfilled by the exhibition of medicines containing phosphoric acid and lime. The phosphate of lime may be given in doses of from five to ten grains three times a-day, suspended in chalk mixture. If the child be anæmic, some preparation of iron may be given at the same time. The dried sulphate of iron is a suitable preparation. If the child be very weak, phosphate of ammonia, in doses of from five to ten grains given three or four times a-day, will be beneficial; milk and lime water in equal parts form an appropriate drink.

3. The distorted limbs must be supported by padded splints, or such other mechanical contrivances as do not interfere with the proper action of the muscles; and care should be taken not to allow the weight of the body to rest on those parts which show a tendency to swell or bend.

MOLLITIES OSSIUM—SOFTENING OF THE BONES.

SYNONYMS.—Osteo-malacia. Malacosteou. Atrophy of bone.

DEFINITION.—Perverted nutrition of the bones resulting in rapid absorption of the earthy matter and consequent softening.

SYMPTOMS.—The symptoms of this disease are very obscure, and its presence is rarely recognised till it has made considerable progress. Severe and long-continued pains in the pelvis and lower extremities, considered as rheumatic pains, have been present in the greater number of cases; but the disease is generally recognised for the first time by

a fracture occurring in one of the bones of the extremities by the application of some slight force; or by the bending, twisting, or distortion of one or other of the limbs; or, in females, by the increasing difficulty of parturition, arising from a growing distortion of the pelvis.

ANATOMICAL CHARACTERS.—The cancelli of the bone completely absorbed, and the bone reduced to a mere shell, filled with medullary matter. The bones so softened as to admit of being cut with a knife. The periosteum sound. The teeth not implicated.

CAUSES.—*Predisposing.* The female sex. It is comparatively rare in men. The adult age. *Exciting.*—Obscure.

DIAGNOSIS.—From rachitis by the age of the patient; rachitis is a disease of infancy and childhood, mollities ossium of adult age.

PROGNOSIS.—Unfavourable; but the disease often makes slow progress.

TREATMENT.—There is no remedy or mode of treatment on which reliance can be placed. The treatment will, therefore, have to be directed to the improvement of the general health, by nourishing diet and tonic remedies, with such other medicines as are indicated by the existing state of the system.

PURPURA—SCURVY.

SYNONYMS.—Hæmorrhœa petechialis. Petechiæ sine febre.

VARIETIES.—1. *Purpura simplex*; 2. *Purpura urticans*; 3. *Purpura hæmorrhagica*, or land-scurvy; 4. *Purpura nautica*, or sea-scurvy.

1. PURPURA SIMPLEX.

SYMPTOMS.—After slight uneasiness, or trifling giddiness, an eruption of small irregularly rounded patches, of a dark-claret colour, chiefly on the thighs and legs, but sometimes extending over the whole body. After a few days, the first patches begin to fade, and new ones appear. The skin very readily bruises, and bleeding from even slight wounds is often controlled with difficulty. There is little disturbance of the general health. The disease may last from three or four weeks to as many years.

PATHOLOGY.—Capillary hæmorrhage in the cutis occurring in isolated spots. Blood deficient in fibrine.

CAUSES.—*Predisposing.* Peculiarity of constitution, debility. *Exciting.*—Febrile states of system. It is often attributed to cold.

DIAGNOSIS.—From other forms of skin disease, by the shape and colour of the spots, and the uninjured state of the cuticle.

PROGNOSIS.—Favourable.

TREATMENT. — A nourishing *mixed* diet, and proper exercise, astringent chalybeate tonics, the mineral acids, and occasional mild aperients.

2. PURPURA URTICANS.

This is a form of skin disease closely allied to urticaria, and consisting in a discoloration of the patches of nettle-rash by blood poured out in small quantity into the cellular tissue. (See *Urticaria*.)

3. PURPURA HÆMORRHAGICA—LAND-SCURVY.

SYMPTOMS.—Weakness, lassitude, and pains in the limbs, with a feeble pulse of variable frequency; petechiæ of larger extent than in the first variety; occasionally bullæ filled with liquid blood; gums swollen, livid, and spongy; hæmorrhage from the gums, nostrils, uterus, and mucons membranes generally; rigidity of the legs from effusion of blood into the texture of the muscles; extensive bruises. In severe cases, all the symptoms of sea-scurvy.

PATHOLOGY.—A diseased condition of the blood. There may be either diminution or excess of fibrine; but in either case this constituent is deficient in power of coagulating, and forms a loose, rotten clot. The albumen is said to be so far changed as to require a temperature 8° higher than usual for its coagulation.

CAUSES.—*Predisposing*. Moist atmosphere, impure water, want of personal cleanliness, overcrowding, and the general causes of debility. The fatigues and privations of military service. *Exciting*.—A diet deficient in nutriment, consisting chiefly of one kind of food, or wanting a due admixture of vegetables.

SEQUELA.—Shedding of the hair.

TREATMENT.—A generous mixed diet, with an allowance of wine or beer, must be prescribed, with astringent tonics, chalybeates and acids, such as $\mathfrak{M}_{xxv}$. Tincturæ ferri sesquichloridi et $\mathfrak{M}_{xv}$. Acidi sulphurici diluti. A table-spoonful of lemon-juice may be given with advantage three or four times a-day.

PROPHYLAXIS.—When purpura hæmorrhagica breaks out in prisons or workhouses, minute inquiries should be made as to the diet of the inmates. It may not be deficient in quantity or in the quality of the articles of which it consists, but it may be wanting in the essential element of vegetables containing an acid. For instance, scurvy has been traced in one case to the substitution of rice, which does not contain such an acid, for the potato, which does contain it; and the restoration of the potato sufficed to banish the disease. As the cheapest of vegetables, answering to this description, the potato should always form part of the ordinary diet of prisons, workhouses, and hospitals.

4. PURPURA NAUTICA. SCORBUTUS—SEA-SCURVY.

SYMPTOMS.—Heaviness, weariness, dejection of spirits, aversion to exercise, dull pains in the limbs, especially during the night; anxiety

and oppression at the præcordia; palpitation and shortness of breath on the slightest exertion; the countenance pale, sallow, and bloated; the skin in some cases hot, in others cold and contracted; the pulse in some cases infrequent, in others small and frequent; the tongue clean, moist, and pale; the gums swollen, spongy, and livid, bleed upon the slightest touch, and at length separate from the teeth, which become loose; the breath offensive; petechiæ appear on various parts of the body; the slightest scratch degenerates into a foul and ill-conditioned ulcer; the slightest pressure produces a bruise, and old cicatrices open afresh, and discharge a thin sanious fluid; spontaneous ulceration likewise takes place upon the gums and on the surface of the body; the joints become swelled and stiff; the muscles of the legs, and the muscles of the calf especially, rigid, contracted, and exceedingly painful; the bowels are either obstinately constipated, or there is diarrhœa; the urine, when not tinged with blood, is transparent, high-coloured, and acid; great emaciation ensues; passive hæmorrhages take place from the gums, nose, and ears, from the stomach and bowels, and occasionally from the lungs and bladder; all the excretions become intolerably fœtid; but the appetite frequently remains entire, the patient retains his intellectual faculties, and talks with a loud voice, but is apt to faint on the slightest motion; and many patients have expired as they were being carried from their hammocks. Sudden death has also often taken place in the earlier stage of the disease, during some violent effort.

CAUSES.—*Predisposing.* A cold moist atmosphere; sleeping in damp clothes or beds; the winter season; cold climates; fatigues and hardships; previous attacks of illness, especially of scurvy; indolence; depressing passions, and the general causes of debility; scanty supplies of water; deficient clothing; want of cleanliness; impure air. *Exciting.*—A diet restricted to a few articles of food, such as salt meat and biscuit; a deficiency of vegetable food, and especially of vegetable acids, or of potash and its salts.

DIAGNOSIS.—*From malignant fever.* By the absence of feverish symptoms; by the intellectual faculties being little impaired; by the disease coming on more gradually, and continuing a much longer time; by the circumstances under which it occurs; by its not being contagious. Between this disease and *Purpura hæmorrhagica* there is no essential difference. The scurvy, as it formerly occurred on land, in besieged cities, in camps, and in monasteries, and occasionally among entire populations, and as it now shows itself from time to time in prisons and workhouses, is essentially the same disease as that which occurs at sea.

PROGNOSIS.—Generally favourable if a proper vegetable diet, or other proper substitute, can be obtained.

Favourable circumstances.—The constitution not having been weakened by previous disease; little reduction of strength; moist skin; bilious diarrhœa; the patient being still capable of moving about; in-

frequent pulse; the petechiæ, if any appear, being of a bright-red colour; the absence of ulceration.

Unfavourable.—Great prostration of strength; extreme oppression at the præcordia; redness of the eyes and flushed countenance; a rapid weak pulse; profuse hæmorrhages; petechiæ of a dark-livid colour, and of great extent; fœtid and involuntary evacuations.

TREATMENT.—*Indications.* I. To supply what is wanting in the diet. II. To palliate urgent symptoms.

I. The first indication is fulfilled by fresh vegetables; the ascendent fruits, as the orange, the lime, and the lemon; fermented and fermenting spirituous liquors, as ale, cyder, and spruce beer, and the light French and German wines. Where great debility is present the stronger spirits may be given, in combination with a vegetable acid, as in punch. The salts of potash, such as the tartrate, acetate, chlorate, and bicarbonate, may also be given with advantage.

Occasional aperients of infusion of tamarinds, cream of tartar, or the sulphates of soda and magnesia may be given, and the utmost attention must be paid to cleanliness and ventilation.

II. The second indication. *Ulcerations of the gums* require astringent gargles of alum, muriatic acid, chloride of soda or of lime, or decoction of bark; or the steam of vinegar. *Acute pains* are relieved by opium; *oppression at the chest and difficulty of breathing*, by diffusible stimulants, such as nitric, sulphuric, or chloric æther with camphor; *contractions of the muscles of the legs*, by hot fomentations of vinegar and water, or emollient cataplasms, and by friction; *scorbutic ulcers* upon the surface of the body by slightly-stimulant applications.

PROPHYLAXIS.—A due admixture with the food of such fresh or preserved vegetables as contain vegetable acids, or where these cannot be procured, lime-juice, lemon-juice, or citric acid. Also the acetate, and bitartrate of potash. Among fresh vegetables, the potato is one of the best. As a moist atmosphere is undoubtedly injurious, dry rubbing should be substituted for frequent washing in our ships. Cleanliness and ventilation should also be rigidly enforced; and where men are placed in circumstances favourable to mental inaction and despondency, such employments and amusements as tend to counteract these states of mind.

RHEUMATISMUS—RHEUMATISM.

SPECIES—1. Acute. 2. Chronic. 3. Muscular.

1. RHEUMATISMUS ACUTUS—RHEUMATIC FEVER.

DEFINITION.—Acute inflammation of the larger joints, accompanied by well-marked febrile symptoms; the inflammation often shifting from joint to joint, and, in many cases, attacking the fibrous textures of the heart.

SYNONYMS.—Acute rheumatism—acute articular rheumatism—acute arthritis.

SYMPTOMS.—The disease generally sets in soon after exposure to cold and wet, with all the symptoms of a severe attack of catarrh; the pain in the back and limbs being unusually severe, and accompanied by a sensation of coldness and stiffness. After a short time (in the course of one, two, or three days) inflammation shows itself in one or more of the larger joints of the body, characterised by redness and heat of surface, acute pain, extreme tenderness, tumour, and tension. There is great constitutional disturbance, with extreme restlessness, intense thirst, and loss of appetite. The pulse ranges from 90 to 120; and is full, hard, and jerking; the blood, drawn from a vein, is cupped and buffed; the tongue is coated with a thick and rough white fur; the bowels are usually obstinately costive; the urine is scanty and high-coloured, and has a strong acid reaction, but at this period of the disease is generally free from sediment. The skin is often bathed in a profuse strong sour-smelling sweat, which, however, affords no relief. The febrile symptoms and the pain generally suffer an exacerbation at night.

The disease is rarely confined to the joints first attacked; but after some hours or days, it attacks fresh joints, sometimes continuing unabated in those first affected, at others leaving them quite free from pain and swelling. In rarer instances, it returns to the joints first affected, and ultimately extends to all the large joints of the body. Some amendment usually takes place at the end of about a fortnight; the pain lessens, especially at night; there is less fever, and less perspiration; the urine is more abundant, and lets fall a copious deposit of the mixed urates; the appetite returns; the thirst diminishes; the pulse falls; and the patient's movements become more free. Convalescence, however, is rarely uninterrupted, and the affection of the joints often assumes a chronic form.

In a large proportion of cases, the disease extends to the fibrous tissues of the heart, and the younger the patient the greater the liability to this affection. The symptoms which denote this formidable complication are dyspnoea, palpitation, and a sense of oppression, increased by pressure in the intercostal spaces, by inspiration, and by lying on the left side. In some cases pain in the region of the heart is superadded. The countenance wears a peculiar listless expression. The pulse is generally quickened, and has a peculiar thrill. As this affection is often obscure, it should be carefully sought for, and its earliest indications attended to.

For the stethoscopic indications, see, under Diseases of the Heart, Pericarditis and Endocarditis.

Sometimes, too, the disease is complicated, and recovery retarded by attacks of bronchitis, pneumonia, or pleurisy; by inflammation of the brain and its membranes; and by inflammation of the sclerotic coat of the eye, all of which diseases are the effects of the rheumatic poison.

ANATOMICAL CHARACTER.—Inflammation of the *fibrous* tissues of the parts affected, generally terminating in resolution, but sometimes

ending in chronic inflammation, and more rarely in deposits of lymph, and consequent permanent stiffening of the joints. In the heart the morbid appearances described under Carditis and Pericarditis.

PATHOLOGY.—Rheumatism is essentially a blood disease, and the poison which is accumulated in it appears to be lactic acid. It also contains a very large excess of fibrine. The urine is excessively acid and high coloured, and contains much uric acid and an excess of urea.

CAUSES.—*Predisposing.* Previous attacks. Youth. Debility. Spring and autumn. *Exciting.*—Exposure to wet and cold.

DIAGNOSIS.—The pathognomonic symptoms of the acute form are inflammatory fever, with pains and inflammation of the larger joints, over which the integuments become distended, smooth, and of a peculiar pale-red colour. The severe muscular pains of commencing *typhus* may cause that disease to be mistaken for rheumatism. Rheumatism may coexist with *variola*, see page 339.

From Podagra (see Podagra). From *Neuralgia*, by the history of the case; by the presence of inflammation and fever; and by the fact that, in neuralgia affecting the same parts, the pain is generally confined to a single joint. From *sypilitic periostitis*, by the extreme tenderness on pressure of the inflamed portion of bone in that disease; and by its occurrence in the bones of the cranium, on the sternum, or on the shin-bone, as well as in the bones forming the large joints; also, by the previous history of the case.

PROGNOSIS.—*Favourable symptoms.* A general, but not unnaturally profuse, perspiration; the repeated or continuous deposit of a lateritious or furfuraceous sediment in the urine; eruptions on the skin;—moderate hæmorrhage of florid blood from the nose or other parts. *Unfavourable.* Metastasis of the inflammation to the heart, chest, or brain. The disease is very rarely fatal; but often leaves behind it organic disease of the heart by which life is shortened, or chronic inflammation of the joints, with a great susceptibility of future attack. In favourable cases, and in persons otherwise of good constitution, the duration of the disease is from three weeks to a month.

TREATMENT.—Many different modes of treatment have been recommended and practised in acute rheumatism. Three plans of treatment are especially deserving of attention: 1. The treatment by alkalis. 2. The treatment by lemon-juice. 3. The treatment by bleeding and quinine.

1. *Alkalis.* Since the system is saturated with acid, the most rational treatment is the alkaline, and it is the most successful. From half a drachm to two scruples of the bicarbonate of potash may be given, dissolved in half a pint of water, every three or four hours. The nitrate, bitartrate, and acetate may also be given with advantage, and in combination with the bicarbonate, if the urine be scanty. An ounce of nitrate of potash, taken in half a gallon of water, is in itself an efficient remedy.

2. *Lemon-juice.* The juice may be given in doses of from half an

ounce to an ounce three times a-day. (Dr. Owen Rees.) The evidence respecting this mode of treatment, though conflicting, is on the whole favourable.

3. *Bleeding and Quinine.* This is a modification of the treatment by bleeding and bark. A single full bleeding is to be followed up directly by sulphate of quinine in two-grain doses every three hours. In favour of this mode of treatment there is also strong evidence, and it is one which I have seen adopted and have frequently practised with advantage. (G.)

The adoption of either of these methods of treatment does not preclude the use of other means in cases of unusual severity, or of a complicated character. The remedies which have to be considered are—1. Bleeding. 2. Aperient medicines. 3. Narcotics. 4. Warm baths; and 5. Local applications.

1. *Bleeding.* This remedy is either followed immediately by quinine or bark, as in the third method of treatment, or it is resorted to under the erroneous idea that the inflammation of the joints is of the character of common inflammation. With whatever view adopted, general bleeding should be had recourse to only at the onset of the disease, and in those cases only in which the vascular action is strong, the heat considerable, the constitution robust, and the patient not advanced in years. It may be repeated if the symptoms continue violent; but the repetition is to be regulated by the effect produced, and not by the cupped and buffed appearance of the blood, which, in many cases, continues to increase, notwithstanding the abstraction of blood. Local abstraction of blood, by leeches or cupping, may be employed when there is considerable pain and tumefaction about a joint or limb.

2. *Aperient Medicines.* A saline purgative, such as a seidlitz powder, or $\mathcal{Q}$ iss of tartrate of potash should be given as often as necessary.

3. *Narcotics.* If the pain be great, x or xii grains of compound ipecacuanha powder may be given every night.

4. *The warm bath* may be used with advantage before the pain in the joints has become so severe as to create difficulty in moving the patient. When the disease is beginning to abate, it may also be administered two or three times a-week. Carbonate of potash or of soda may then be added to the bath in sufficient quantity to render it decidedly alkaline.

5. *Local applications.* The affected joints should be enveloped in cotton wool. When the skin perspires profusely, and the surface is very hot, cloths dipped in an alkaline lotion (Potassæ carb. $\mathfrak{z}$ ss. Aquæ Oss.) and covered with oilskin, may be substituted; or, if the pain be very acute and the patient restless, lint saturated with belladonna or chloroform liniment, may be laid on the part. Small blisters applied to the joints as they are successively affected, often give great relief.

When the disease is complicated with heart-affection, cupping, followed by blisters to the region of the heart, is indicated; or, if the patient be very weak, a large blister, dressed with mercurial ointment,

at the same time that calomel and opium are given with a view to affect the system. (R. Calomelanos, gr. i. or Pil. hydrarg. gr. iii. Pulv. opii, gr. $\frac{1}{4}$ every two or three hours); or we may give at intervals of three or four hours a combination of tartar emetic, digitalis, and opium (Vin. antim. pot. tart. f. ʒss., Tinct. opii, $\mathfrak{m}\mathfrak{v}$. vel $\mathfrak{m}\mathfrak{x}$., Tinct. digitalis, $\mathfrak{m}\mathfrak{x}$.) The effect of the digitalis on the circulation to be carefully watched, and the dose increased or lessened according to circumstances.

2. CHRONIC ARTICULAR RHEUMATISM.

SYMPTOMS.—The chronic form of rheumatism may be a consequence and termination of the acute, or it may be independent of it. In the first case, the affected joints are left weak, stiff, and, in some instances, œdematous; and the pain, which was before shifting, is now usually confined to particular joints. Sometimes, however, it still shifts from joint to joint, but is not attended by acute inflammation or fever. Exposure to wet and cold will often bring on an attack, which continues for a considerable time, and at length goes off, leaving the affected joints weak and stiff.

Chronic articular rheumatism, when not a sequel of the acute disease, generally attacks the smaller joints of the hands and feet, and is then commonly called rheumatic gout.

When the disease is confined to one or two joints, local applications are indicated; leeches on every marked return or increase of inflammation; blisters at a short distance from the affected joint, or even to the joint itself; and friction. Where there is much effusion about the joints, electricity or electro-magnetism may be advantageously employed. Where the disease is more extensive, we must employ general remedies to the exclusion of local ones. The vapour-bath is amongst the most powerful of these remedies. The warm bath is of less efficacy, but the thermal mineral waters of Vichy, Aix-la-Chapelle, Karlsbad, Wiesbaden, Buxton, &c., have long enjoyed a high and deserved reputation in the treatment of chronic articular rheumatism. A warm climate also proves beneficial to cases which have arisen in a cold one, though warm climates are peculiarly favourable to the occurrence of rheumatic affections.

REMEDIES.—Dover's powder in repeated small doses (gr. τ . three times a-day); Vinum colchici ($\mathfrak{m}\mathfrak{x}\mathfrak{x}$.) in combination with opium (Tinct. opii, $\mathfrak{m}\mathfrak{v}$.); guaiacum, in the form of the mixture, or ammoniated tincture; iodide of potassium (gr. iii. to gr. v.) with sarsaparilla (especially indicated where there is a syphilitic taint).

3. MUSCULAR AND TENDINOUS RHEUMATISM.

Varieties.—Some forms of the disease have distinct names, according to the seat of the affection; as *pleurodyne*, when it attacks the muscles of the side; *lumbago*, when the seat is in the loins; *crick in the neck*, when it affects the neck. Rheumatism of the muscles of the back of

the thigh is sometimes, though incorrectly, called *sciatica*. The pain is very frequently localized in a particular tendon, at its insertion into the bone, *e. g.* the insertion of the deltoid, and tendo Achillis.

SYMPTOMS.—Pain, varying in character and severity, from a dull aching to the most acute lancinating pain, affecting the entire body, the trunk, a single limb, or a single muscle or group of muscles; coming on sometimes suddenly, at others after shivering and slight feverishness: often forming the most distressing features of a common cold, and remaining after the other symptoms have vanished. The severe pains in the chest and abdomen, which accompany spinal irritation, are to be distinguished from rheumatic pains. (See Spinal Irritation.)

PROGNOSIS.—*Favourable*. The disease is free from danger. Its duration may vary from a few hours or days to as many months or years. The general health is little if at all affected.

DIAGNOSIS.—The pain is increased by motion of the affected part, by percussion with the points of the fingers, and by the sudden removal of pressure; but it is relieved by firm pressure gradually applied. It is sometimes augmented, sometimes relieved, by the warmth of bed.

TREATMENT.—This form of rheumatism is also benefited by alkalies, but its complete removal requires a long continuance of the treatment. An occasional dose of tincture of colchicum (℥xx.) and tincture of opium (℥xv.) may be given, or the same dose of tincture of colchicum with ℥v tinct. opii, in a saline aperient, may be given three times a day. Guaiacum, in combination with alkalies, is often efficacious. Opiate liniments or small blisters may be occasionally applied to the painful part. Magneto-electricity, and the hot bath, often afford much relief. The condition of the urine will in every case furnish useful indication as to treatment. If it contain excess of uric acid we must persevere with alkalies.

PROPHYLAXIS.—Persons subject to rheumatism should wear flannel next the skin; they should protect the parts most liable to the disease; and avoid malt liquors and exposure to wet and cold.

PLEURODYNE.

This is a very common affection. Pain in the left side is present in almost all the functional diseases of young and middle-aged females; in dyspepsia, amenorrhœa, menorrhagia, leucorrhœa, hyperlactatio, and chlorosis, and in debility, however induced. In males it is equally common on both sides. It often accompanies chronic rheumatic pains of the joints or tendons. Acute pain in the muscles of the left side generally precedes by some days or weeks the appearance of shingles. (See Herpes zoster.)

CAUSES.—*Predisposing*. Debility. *Exciting*.—Over-exertion, as in the effort of coughing, and distension of the stomach with flatus. The Rheumatic poison.

DIAGNOSIS.—The *diagnosis* of pleurodyne is of great importance, though the disease itself is of little or none. It is distinguished from pleuritis, with which it is often confounded, to the great injury of the patient, by the absence of the constitutional symptoms of the acute inflammation, and of the stethoscopic indications of pleurisy; by being increased by motion of the affected parts, as in raising the arm, or twisting suddenly round, or by a sudden inspiration or expiration, by the effect of sudden and slight percussion with the points of the fingers, and by the immediate increase of the pain on the removal of pressure. It is distinguished from the neuralgic pain preceding the eruption of shingles by its less severity.

COMPLICATIONS.—With chest disease (for it is a common consequence of a cough); with acute dyspepsia; and with any of the debilitating diseases mentioned above.

TREATMENT.—The emplastrum belladonnæ, or the emplastrum opii; or, in mild cases, the common emplastrum roborans should be applied to the seat of the pain; in more severe cases, a blister, with the internal administration of colchicum. Symptomatic pleurodyne must be treated by removing its cause. When the affection accompanies rheumatism or gout, the treatment appropriate for those diseases should be adopted.

Allied to pleurodyne is an acute pain of the muscles of the abdomen or diaphragm, or of both together. That of the abdomen is apt to be confounded with peritonitis, as pleurodyne with pleurisy. The diagnosis is easy. Graduated pressure gives relief, except when a sudden expiration throws the muscles into action; but the sudden removal of pressure, percussion with the points of the fingers, and sudden motion of the part affected, increase the pain. The absence of severe constitutional symptoms will assist the diagnosis, as will also the kind of respiration. In pleurodyne, the respiration is abdominal; in rheumatism of the muscles of the abdomen, thoracic. When the diaphragm is affected, the respirations are short and catching, and accompanied with acute suffering.

Muscular rheumatism also attacks internal viscera, as the muscular texture of the heart, causing violent palpitation; the muscular coat of the œsophagus, giving rise to much pain in swallowing; and the muscular substance of the impregnated uterus leading to severe pains, similar to labour pains. Many internal muscular pains are connected with flatulence, or are symptomatic of dyspepsia.

LUMBAGO.

This disease occupies the mass of muscles in the loins, and, when severe, confines the patient to bed, or obliges him to walk carefully with crutches, or with the assistance of others. The slightest motion causes excruciating agony.

DIAGNOSIS.—From the pains in the back which accompany the cold stage of febrile disorders, by the effect of motion, which increases the

pain of lumbago, but has no effect on febrile pains. From *disease of the kidneys*, by the urine remaining unchanged in character, or yielding merely the common deposits; and by the absence of symptoms of disease of the kidney. Transient and severe attacks of rheumatism in a single muscle or group of muscles sometimes pass off, after lasting a few hours or a day, by a copious red sediment in the urine. From *lumbar abscess*, by the absence of rigors, and of hectic fever, and by the negative results of a careful examination of the part affected. [It should be borne in mind that collections of matter in the muscles of the back may *point* at the lower part of the back itself, at any part of the abdominal parietes, or below Poupart's ligament.]

TREATMENT.—The general treatment is that of other forms of muscular rheumatism (see *supra*). The local treatment consists in cupping the loins, or in dry cupping, if the pain be very severe, followed by the emplastrum belladonnæ. In less severe cases, a liniment containing laudanum (Liniment. saponis, or Liniment. camph. f ʒvss. Tinct. opii f ʒss) may be rubbed into the seat of the pain three or four times a-day; or the Emplast. opii, or Emplast. picis may be kept applied to the back.

PODAGRA—THE GOUT.

VARIETIES.—1. Regular gout; 2. Misplaced gout; 3. Atonic gout; 4. Retrocedent gout.

SYMPTOMS.—The first paroxysm of gout generally comes on about two o'clock in the morning, with pain in the ball of the great toe of one foot (more rarely in the heel, ankle, or instep), accompanied by rigor, followed by feverish heat. The pain increases in violence till it becomes perfectly excruciating, and is accompanied by extreme restlessness. The joint is, at the same time, exquisitely tender, so that the patient cannot bear the weight of the bed-clothes, or the slightest jar or movement in the room. The pain having attained its acme towards the following evening, ceases sometimes suddenly, sometimes gradually, about midnight; a general moisture breaks out upon the skin, the patient falls into a sound sleep, and in some cases wakes free from pain. But in the majority of cases, on awaking next morning, he finds the parts, which were before so painful and swollen, of a deep red colour, tense and shining, the surrounding parts œdematous, and the vessels turgid. For several days and nights the same round of symptoms occur in a mitigated form, till at length the redness and the swelling subside, the skin desquamates, and the joint is either restored to its healthy state, or becomes the seat of the chronic form of the disease.

It rarely happens that one fit of gout is not followed, at a longer or shorter interval (sometimes of months, sometimes of years), by a second attack. Most patients indeed have several successive attacks, which at first occur at the same season of the year, but at length take place very frequently, extending first to both feet simultaneously or in succession, then to the hands, and at length to almost all the joints. These subsequent attacks set in at all hours of the day and night, commence sometimes in the hand, sometimes in the foot, sometimes in the great toe or thumb, in other instances in the joints of the wrist or ankle. They are attended with less pain, but with more constitutional disturbance. At length, after repeated attacks, the joints become stiff, and in many cases they are the seat of chalky deposits.

The fits of gout sometimes appear without distinct premonitory symptoms, but they are generally preceded by dyspepsia, with its usual attendants, dejection of spirits, and irritability of temper; or by unusual coldness and numbness of the extremities, alternating with a sense of pricking or formication, frequent cramps, and unusual turgescence of the veins of the leg.

When the gouty diathesis prevails in the system, but without producing the usual inflammatory affection of the joints, it often appears as an affection of some internal part. If it attack the *stomach*, there is great depression and anxiety, followed by intense gastralgia, nausea, vomiting, and eructations, frequently accompanied by pains and cramps of the trunk and upper extremities. Sometimes there is obstinate constipation, sometimes diarrhoea. If the *heart* be attacked, palpitation, syncope, and angina are the symptoms present; if the *lungs*, dyspnoea, asthma, and sometimes a persistent spasmodic cough. When the *head* is affected, there are headache and giddiness, followed sometimes by apoplectic and paralytic affections. When it attacks the *spinal cord*, it gives rise to severe neuralgic affections, terminating in paralysis. These gouty affections of internal parts, without inflammation of the joints, have been termed *misplaced* gout, or *atonic* gout, on the supposition that the system had not strength to throw the disease out.

Sometimes the inflammation of the joints having come on in the usual manner, but without attaining the usual severity, or continuing for the customary time, suddenly ceases, while the disease is transferred to some internal part. This is called *retrocedent* gout.

PATHOLOGY.—A blood disease, caused directly by an excess of uric acid in the blood. The local manifestation of the disease is due to the deposit of crystalline urate of soda in the inflamed part, not merely upon the surface of the synovial membrane, but within the substance of the cartilages and fibrous tissues themselves.

Uric acid may thus readily be detected in the blood of persons predisposed to, or suffering from, an attack of gout. Add six drops of ordinary acetic acid to a fʒj. of the serum; suspend a thread of cotton in the mixture, and after twenty-four or forty-eight hours, a string of

minute rhombs of uric acid will be formed along the thread. (Garrod.)

Chronic gout sometimes results in one of the most inveterate forms of albuminuria, and the kidneys are found reduced to half their size and weight, shrivelled and granular, the cortex atrophied, and the pyramids streaked with white lines of deposited urate of soda, constituting the "gouty kidney" of Dr. Todd.

CAUSES.—*Predisposing and remote.* The male sex; the adult age, and particularly the middle period of life (it seldom occurs before the age of puberty, and in a large proportion of cases makes its first attack between 30 and 40); hereditary predisposition; plethora; a full diet of animal food; fermented and especially malt liquors; acid and acescent wines; a sedentary and studious life; dyspepsia. Gout is not peculiar to the rich, but often affects poor persons of temperate habits after a period of long privation.

Exciting.—Cold to the extremities; fatigue; anxiety of mind; excessive evacuations; sprains and blows; intemperance; the ceasing of usual labour; a sudden change from a full to a spare diet; the suppression of customary evacuations, as of the piles, which are common in gouty persons.

DIAGNOSIS.—From *rheumatism*, by the seat of the disease being the smaller joints, especially the great toe, while rheumatism attacks the larger joints. By the more intense colour of the inflamed part. By its more sudden attack. By the more frequent and distinct remissions of fever and pain. By the itching and desquamation. By the absence of the profuse acid perspiration of acute rheumatism. Sometimes by the age at which it occurs; acute rheumatism being not uncommon in childhood, while gout is very rare before puberty. By the more rapid and complete convalescence. By its being much more common in men than women, while rheumatism is nearly equally common in either sex. By occurring in free livers, and persons of full habit, rheumatism being commonly a disease of debility. Sometimes also by its hereditary transmission, acute rheumatism being rarely an hereditary disease. The metastasis from joint to joint, and the heart affections so common in acute rheumatism, are comparatively rare in gout. By metastasis to the eyes affecting the cornea in gout, and the sclerotic coat in rheumatism. Gout is further distinguished from rheumatism in chronic cases by the *chalk-stones* in the joints of the hands and feet, or in the cartilages of the ear. Also by the detection of uric acid in excess in the blood, or in the serum of blistered surfaces.

PROGNOSIS.—*Favourable.* Youth, and an unimpaired constitution; a first attack; the more severe the paroxysm, the shorter its duration; the longer the intermission, the more effectual is the paroxysm in removing various anomalous diseases, to which the patient had been subject; its not being hereditary. *Unfavourable.*—Impaired constitution; advanced age; visceral affections; hereditary predisposition;

the deposition of chalky matter in the joints: the disease suddenly leaving the extremities, and attacking the stomach, heart, brain, or lungs; anasarca, or albuminuria, or both combined.

TREATMENT.—*Indications.* I. To shorten the paroxysm, and relieve the sufferings of the patient. II. To prevent the recurrence of the paroxysm.

I. An attack of gout may be effectually shortened by the preparations of colchicum, administered in one of two ways: in a full dose (ʒss. to ʒii.) of the *Vinum Colchici* at bedtime, followed by a saline aperient in the morning; or, in the smaller dose of ℥xx. three or four times a-day. In either case the colchicum should be combined with laudanum. When administered in a single dose, the following formula will be found convenient: *R.* Vin. colchici, fʒi.; Tinct. opii, f. ʒss.; Aquæ cinnamoni, Aquæ āā, f. ʒss. m. f. Haustus, h. s. s. When given in smaller repeated doses the colchicum and opium should be combined with a saline aperient. *R.* Magnesiae sulph. ʒss.; magnesiae carb. gr. x.; vin. colchici, ℥xx.; Tr. opii, ℥v. If the medicine occasions diarrhœa, we may substitute the following:—Potassæ bicarbonatis, gr. xx.; Liq. ammon. acet. f. ʒss. Vini colchici, ℥xx.; Tr. opii, ℥v.

The dose of colchicum may be diminished as the inflammation abates, and it may be given in small doses of from five to ten minims, in combination with a gentle saline aperient, for several days, or one or two weeks, after the disappearance of the malady.

The *local* treatment consists in wrapping the inflamed part in flannel, wool, or fleecy hosiery, and keeping the limb as still as possible. Opium and atropine lotions may be used to alleviate the pain.

Carbonate of lithia has been lately introduced as very suitable for the elimination of the gouty material, since 1 grain dissolved in 90 parts of water took up 4 grains of uric acid, and formed a soluble compound with it. (Lipowitz.) It promises to be an useful remedy. It may be given in doses of iii or iv grains, alone, or in combination with gr. xxx. of bicarbonate of potash.

II. The second indication is fulfilled by regular living, avoiding the exciting causes of the disease; by abstinence from fermented liquors, by the moderate use of animal food, and by a milk and vegetable diet; friction with the flesh-brush; regular and brisk exercise; Bath waters; the regular use of mild aperients; the continued use of alkaline medicines; and when dyspeptic symptoms are present, the treatment applicable to dyspepsia.

Treatment of retrocedent Gout.—If the stomach be attacked, the liberal administration of stimulants, such as warm brandy and water, wine and aromatics; æther, ammonia, camphor, and musk. Sinapisms should also be applied to the feet, with a view of restoring the external inflammation. Other forms of retrocedent gout must be treated by remedies appropriate to the idiopathic affections of the same organs.

GOUTY CONCRETIONS.—Gouty concretions, chalk-stones, or tophaceous deposits, consist chiefly of urate of soda, and are deposited

around the joints, in the bursæ mucosæ, in the ligaments, aponeuroses, and cellular membrane, and even under the cuticle. The pain which they occasion may be relieved by warm poultices, which will also promote separation by suppuration. Great relief is also sometimes experienced from applying rings of blistering plaster above or below the swollen joints. The joints may also be treated with iodine paint. A narcotic cataplasm or anodyne fomentation also affords great relief. For gouty concretions Dr. Alexander Ure (see *Med. Chir. Trans.*, vol. xxiv.) recommends the exhibition of Benzoic acid in doses of a scruple about an hour after each meal. This substance is advantageously combined with some salt of soda, and the best for the purpose is the bicarbonate, which may be given in doses of one, two, or three drachms. The remedy must be persevered in for a considerable period where extensive deposits have already taken place. The iodide of potassium may be given for the same purpose, or the phosphate of ammonia (ten grains three times a-day. Dr. Edwards). Perseverance in potash lotions and baths will be attended with decrease in the deposit. The waters of Aix-la-Chapelle, Vichy, Töplitz, Marienbad—all of which contain lithia—should be taken in lieu of spirits, wine, or malt liquors. Sometimes suppuration occurs around the chalky joint. A foul ulcer results, and as the urate separates very slowly, the wound is healed with difficulty. It should be lightly dressed with a weak potash or lithia lotion. In such a case we must very gently assist nature.

SPECIAL DISEASES.

CHAPTER I.

DISEASES OF THE NERVOUS SYSTEM.

1. Of the Brain.
2. Of the Spinal Marrow.
3. Of the Nerves of Sensation.
4. Of the Nerves of Motion.
5. General Disorders of the Nervous System.
6. Mental Disorders.

DISEASES OF THE BRAIN.

CEPHALALGIA	. . .	Headache.
ENCEPHALITIS	. . .	Inflammation of the Brain.
MENINGITIS	. . .	Inflammation of the Membranes.
HYDROCEPHALUS	. . .	Water in the Head.
APOPLEXIA	. . .	Apoplexy.
CHRONIC DISEASES OF THE BRAIN.		

CEPHALALGIA—HEADACHE.

SYNONYM.—Cephalæa.

Headache is a symptom of almost all acute and chronic diseases of the brain, as well as a distinct functional derangement of very frequent occurrence.

SPECIES.—(a.) External, (b.) Internal.

(a.) External. 1. Cephalalgia muscularis; 2. Cephalalgia periosteosa; 3. Cephalalgia neuralgica.

(b.) Internal. 1. Cephalalgia congestiva; 2. Cephalalgia dyspeptica, vel sympathetica. Cephalalgia organica

EXTERNAL.—1. *Cephalalgia muscularis*, or pain of the muscular covering of the head, affects the occipito-frontalis and temporal muscles. *Diagnosis*.—The pain is diffused over the head, is increased by motion of the eyebrows and jaws, by pressure, and by percussion

with the fingers. It is subject to remissions, and is generally accompanied by pain in the face, neck, shoulders, or other parts of the body. *Cause*.—Exposure to cold. *Treatment*.—That of common cold when recent (see Catarrh), and that of muscular rheumatism when chronic (see Rheumatism). In severe cases, leeches or a blister to the back of the neck.

2. *Cephalalgia periosteosa*.—Seat, the pericranium.—*Diagnosis*. The pain is commonly limited to one spot, and is increased by firm and deep pressure, but is little, if at all, affected by action of the muscles. It sometimes affects the periosteum of the face at the same time, so that the nose is tender to the touch; and it frequently extends to other parts of the body, especially to the shin and sternum. When limited to one spot, it is commonly attended with swelling. *Causes*.—This form of headache is generally traceable to a syphilitic taint, and coexists with similar affections of other bones. In many cases, too, it will be found to have been preceded by ulcerated sore throat, or by syphilitic diseases of the skin. The health also suffers. The appearance and expression of countenance are those familiarly known as *Cachexia syphilitica*.—(See Cachexia, p. 289.) *Treatment*.—That of secondary syphilis. The iodide of potassium in five-grain doses, in infusion of quassia, or other tonic infusion, or with the simple or compound decoction of sarsaparilla, should be given three or four times a-day. If the bone be affected, and matter formed, free incisions will be required, followed by the treatment prescribed in surgical works for the diseases of bone.

3. *Cephalalgia neuralgica vel periodica*.—Seat, the nerves of the internal angle of the orbit and side of the nose (*megrin*), fixed in one spot causing a sensation as if a nail were driven into the head (*clavus hystericus*), or of one side of the head and face (*hemicrania*.) *Diagnosis*.—Its periodic character distinguishes it from *tic-doloureux*, and the pain is of a sharp darting character, and is more common on the left than on the right side. It occurs with regularity at the same intervals as ague, and in some instances at the longer intervals of ten days, a month, or a year. In some cases the intermittent passes to a continued pain, and in many patients the disease is never distinctly intermittent, but is characterised by irregular intervals of perfect ease, and by being bounded by the central line of the head and face. The paroxysm may last for any period from an hour to two days. The disease is more common in women than in men, and in young than in old persons. But it may occur at any age. In the worst case the pain is of the most acute character, and is brought on by eating or speaking, or by drafts of air; and it may involve the upper lip, gums, cheek, and temple, causing an abundant flow of saliva, and of tears. Sometimes, too, the fit is preceded by heat and redness of the parts, with salivation. The absence of tenderness, and of increase of pain on contraction of the muscles of the scalp, distinguish it from the first and second forms.

Cause.—Exposure to cold and wet—marsh miasma. *Treatment*.—

The same as for ague, viz., quinine (in doses of two grains), or liquor arsenicalis (in doses of five drops, combined with some tonic infusion, three times a-day). The latter remedy, cautiously administered, is to be preferred. The treatment is the same, whether the disease be distinctly intermittent or merely limited in the manner just stated. The general health must at the same time be attended to. *Remedies.*—
 ‘In some cases, where everything else had failed, a draught with one quarter of a grain of emetic tartar and forty drops of tincture of laudanum, taken at bed-time, has made a lasting cure.’ (Heberden.)

Doyle
an. 67 INTERNAL.—1. *Cephalalgia congestiva*, or *congestive headache*. This presents itself in three different states of constitution—the plethoric, the delicate and irritable, and the weak and leucophlegmatic. *Diagnosis.*—Obtuse pain, affecting the whole of the head, especially the forehead and occiput, combined in the *plethoric* with a bloated countenance, a full red eye, distension of the veins, a full pulse, and a dull and heavy expression of face: in the *delicate and irritable*, with flashes of light, floating specks before the eyes, noises in the ears, cold extremities, and a small, frequent, quick pulse; in *anæmic* subjects, with pale skin, lips, tongue, and gums, cold extremities, beating at the heart, violent throbbing of the carotid arteries, and small, frequent, quick pulse. In the two latter classes of persons, it is brought on in severe paroxysms, by sudden noises, mental emotions, or violent muscular exertion. *Treatment.*—In the *plethoric*, that of plethora (p. 284). In the *delicate and irritable*, by repose of mind, careful attention to the state of the stomach and bowels, and sedative medicines. A pill, combining a sedative with an alterative, may be given every night, or every other night; and a saline aperient, combined with some tonic infusion, every morning, or every other morning. (R. Pil. calomelanos comp. gr. i.; Pil. rhei. c., Ext. conii, āā gr. ii. f. pilula. R. Sodæ sulphatis ℥ss.; Sodæ carb. gr. x.; Tinct. zingib. f. ℥ii.; Infus. cascarillæ f. ℥x.) (See *Mimosis inquieta*, p. 293.) In *anæmic* subjects the treatment of anæmia (p. 287).

A congestive headache allied to the first form (the plethoric) may be caused by narcotic and narcotico-acrid poisons; and it may occur at the setting in of febrile disorders (attended in these cases by pain in the back and limbs) at the onset of attacks of apoplexy, and in the early stage of phthisis pulmonalis (when it commonly affects the forehead).

2. *Cephalalgia dyspeptica vel sympathetica*.—*Sick headache.*—*Diagnosis.* From other headaches by the marked disorder of the stomach, or of the whole alimentary canal. *Symptoms.*—Pain usually fixed, in the left temple, over the right eye, or on the forehead. It commonly commences when the patient first rises in the morning, and in slight cases continues till after breakfast; in more severe ones, it begins as a diffuse heavy pain, and gradually becomes fixed in one spot, accompanied with nausea, flatulence, sour eructations, and vomiting. There is also confusion of thought, dimness and indistinctness of vision, and singing in the ears. Sometimes the fit is removed by free

evacuation of food, or of frothy mucus or bile from the stomach; and this is sometimes accompanied, or followed by, diarrhœa. Its duration varies from some hours to three or four days, and in confirmed cases it returns at short intervals, and is attended with great suffering. Sometimes there is much flatulence, and relief is only afforded by free eructation. *Cause*.—Derangement of the functions of the stomach and bowels. The abuse of aperient medicines, by which the tone of the alimentary canal is weakened. Sick headaches are common just before and after the menstrual period. *Treatment*.—Gentle aperients in combination with alkalies, as rhubarb with soda, or magnesia. Regulation of the diet; proper exercise; emetics, where the cause is transient. In cases of obstinate sick headache, emetics of ipecacuanha may be administered every morning with the best effect. If large quantities of bile are ejected from the stomach (bilious headache), small doses of calomel, or hyd. c. cretâ (a quarter of a grain of the first, or a grain of the second, administered three times a-day, with two or three grains of extract of poppy), will be found useful. When the bowels are very irritable, and act irregularly, the compound rhubarb pill should be combined with an equal part of extract of conium. When much flatulence is present, ginger or alum may be combined with the other medicines, or strong mint-water may be made the vehicle of saline aperients. Cold to the head sometimes acts as a palliative. A draught containing from five to ten grains of carbonate of ammonia given at the commencement of the attack will sometimes arrest it. (R. Ammon. carb. gr. v. vel x. Sodæ bicarb. gr. x. Infusi. Cascarillæ f. ʒi.)

3. *Cephalalgia organica*.—*Diagnosis*. This pain is distinguished from the foregoing forms either by appearing to affect the entire brain, or by being fixed and deep seated, but not acute, and in either case being sensibly increased by motion and change of posture, by heated rooms, by noise, and by mental application. It may be accompanied by disordered digestion, but it is not relieved by vomiting. It is also subject to marked increase and decrease of severity, but rarely suffers a complete intermission. The nature of the disease is at length made known by some marked disorder of the functions of the nervous centres, by paralysis, spasms, or convulsions. The pain is, for obvious reasons, allied to the plethoric variety of congestive headache. *Treatment*.—That of the disease of which it is the symptom. The state of the circulation through the brain must be carefully watched, and local and general blood-letting, purgatives, and counter-irritants, must be resorted to; at the same time that strict attention is paid to the state of the general health. In chronic inflammatory affections of the brain, a course of mercury, carried to the extent of affecting the mouth, will sometimes effect a cure.

Great caution is necessary in inquiring into the cause of headache, and in discriminating one form from another; the treatment will entirely depend on the accuracy of the diagnosis. Sometimes, for instance, a patient complaining only of headache, will be found to be suffering from phthisis pulmonalis. (G.)

ENCEPHALITIS—INFLAMMATION OF THE BRAIN AND ITS MEMBRANES.

SYNONYMS.—Phrenitis. Meningo-encephalitis.

SPECIES.—1. General, that is, involving the whole, or a considerable part, of the substance and membranes of the brain. 2. Partial, or affecting only a part of the substance, or of the substance and membranes, of the brain.

1. GENERAL INFLAMMATION OF THE BRAIN AND ITS MEMBRANES.

SYMPTOMS.—This disease does not always commence in the same way. In one class of cases it begins with acute pain in the head and violent delirium; in a second with nausea, bilious vomiting, and obstinate constipation; in a third with a paroxysm of general convulsions; in a fourth, and very rare class, with loss of speech.

The disease, when fully formed, is characterized by excruciating pain in the head; throbbing of the temporal and carotid arteries; flushed face; injected and brilliant eyes; contracted pupil; and a peculiarly wild expression of countenance. There is intolerance of light and sound, extraordinary acuteness of the senses, constant watchfulness, want of sleep, fierce delirium, and convulsions. The skin is hot and dry, the pulse hard and frequent, sometimes full, sometimes contracted; the tongue red and dry, or covered with a white fur; there is intense thirst, with nausea and bilious vomiting; and the bowels are obstinately confined. These symptoms belong to the stage of *excitement*, and continue for a variable period of from one to three days, when, gradually subsiding, they are succeeded by low muttering delirium, deafness, indistinctness of vision, insensible pupil, strabismus, twitchings of the muscles, tremors, or partial paralysis, relaxation of sphincters, occasional retention of urine, cold sweats, and the facies Hippocratica: or by profound coma.

TERMINATIONS.—When fatal, in coma; or in great prostration of strength, with typhous symptoms. Recovery may be complete, or the disease may end in mania, dementia, or paralysis. Its duration varies from one or two days to two or three weeks, or even more.

CAUSES.—Excessive heat, or great vicissitudes of temperature; the direct rays of the sun, (*coup de soleil*); violent exercise; excited passions; intense study; irritating matter in the stomach; external violence; the abuse of spirituous liquors; metastasis of gout, rheumatism, erysipelas, exanthematous fevers, small-pox, measles, and scarlatina; the repression of cutaneous affections, especially those of the scalp; whooping cough; dentition. Inflammation of the brain may also supervene on pneumonia, phthisis, renal affections, and all febrile diseases. It is often induced by pyæmia.

DIAGNOSIS.—From *mania*, by the marked febrile symptoms and rapid course. From *febrile delirium*, by the delirium being a primary and not a secondary affection. From *the delirium of typhus*, in most cases, by its sudden accession and great violence. From *the effects of loss of blood*, by the history of the case, the inflammatory symptoms, and the flushed face. From *delirium tremens*, also, by the history of the case, by the hot dry skin, and high fever, by the want of consciousness, and by the absence of the tremulous motions of the body and limbs. In most cases of *delirium tremens* the face is pale and the skin moist; the limbs tremble, and the patient can understand and answer questions.

MORBID ANATOMY.—Thickening of the arachnoid, effusion of serum, of lymph, or of a mixture of the two, or of pus, under the arachnoid and into the meshes of the pia mater, or into the ventricles, with softening of their walls; the incised surfaces of the brain present numerous red points, the medullary substance is of a light pink hue, and the cineritious substance is of an ashy red, not removed by washing; suppuration, softening, or hardening of the substance of the brain.

PROGNOSIS.—*Favourable*. The return of sleep and consciousness; a warm and equable perspiration; diarrhœa; hæmorrhage from the nose; diminished frequency, and greater fullness and softness of the pulse; inflammation attacking a less important part. If preparations of mercury have been given, the occurrence of salivation. *Unfavourable*. Stupor, difficulty of deglutition, profound insensibility, tremors, convulsions; involuntary evacuations; suppression of urine; pallor of the face; paralysis.

TREATMENT.—I. *During the period of excitement. Indication.* To lessen the force of the cerebral circulation.

(a.) By application to the shaved head of cold lotions constantly renewed, or ice, or a stream of cold water. This latter is to be preferred to all other means of applying cold, especially when there is violent delirium.

(b.) By bleeding.—A copious and sudden evacuation of blood from a free orifice in the arm, in the erect or semi-erect position, to be repeated, if necessary, proportioning the quantity to the age, sex, temperament, and habit of the patient; followed, if necessary, by cupping or leeches to the temples, or by opening the temporal artery.

(c.) By active purging at the outset with castor or croton oil, or with a full dose of calomel and colocynth, followed by the senna draught; the action of the bowels to be kept up, and salivation, if possible, induced by half-grain doses of calomel every two, three, or four hours.

(d.) By depressants, in doses short of inducing vomiting. Of these the tartar-emetic is the best. It may be given in doses of a sixth to a fourth of a grain, cautiously increased, and at frequent intervals, and may be combined with the calomel.

(e.) By counter-irritants to the extremities, such as the mustard-

poultice, or a large blister to the inside of the thighs, or hot water to the feet frequently renewed.

(f.) By strict antiphlogistic diet; no food whatever should be allowed during the inflammatory period, except weak tea, barley-water, gruel, sago, panada, arrowroot, or the like.

(g.) By complete rest and perfect quiet. The sick-room should be kept dark and silent.

By a proper posture. The head should be raised by pillows.

II. *During the period of torpor.*—If the patient have not been already bled, and the pulse remain hard and frequent, general or local abstraction of blood is indicated, proportioned in quantity to the remaining strength of the patient. Brisk purgatives may also be given with advantage at this stage. Counter-irritation by mustard poultices or blisters may be applied to the inside of the thighs.

When the symptoms of excitement have passed away, and insensibility or general torpor remains, a large blister to the scalp will often prove useful. In extreme collapse, ammonia, wine, and brandy must be given, with beef-tea and nourishing food, and opium or laudanum may be cautiously administered. The state of the bladder must be ascertained at every visit, and, if necessary, the water must be drawn off two or three times a-day.

III. *During convalescence.*—The patient must be narrowly watched, the diet carefully regulated, and the bowels kept free by gentle aperients. The patient should not be allowed to resume his ordinary occupation till his health is quite re-established. On the occasion of relapse, cold applications to the head, counter-irritants, and more active purgatives should be resumed. If the mind does not recover its tone, but the memory is impaired, and the patient remains weak and irritable, the cold douche or the shower-bath every morning, with or without blisters to the scalp, or a seton in the neck or arm, may be resorted to.

When the disease is symptomatic of intestinal irritation in children, or of remote visceral disease in adults, special attention will have to be given to the local complication.

2. PARTIAL INFLAMMATION OF THE BRAIN WITH OR WITHOUT IMPLICATION OF ITS MEMBRANES.

SYMPTOMS.—These are often very obscure; and vary with the extent, degree, and progress of the inflammation, as well as with the part of the brain attacked. In most cases, the first symptom is pain in the head, more or less severe, rarely altogether absent, but subject to exacerbations, under the influence of causes affecting the circulation, and accompanied from the first, or followed after a time, by giddiness, ringing in the ears, indistinct or disordered vision, numbness or increased sensibility of the fingers, of the hands and arms, or of other parts of the surface of the body; and slight convulsive movements of the limbs, with occasional attacks of nausea and faintness. The

patient is restless and irritable, or suffers from extreme depression of spirits; the sleep is disturbed, and the mind generally more or less impaired. The state of the circulation is very variable, the pulse being at one time slow and regular, and the countenance pale; at another time, the pulse being frequent and the face flushed; these two opposite states often alternating with each other at short intervals. In some cases the symptoms are distinctly remittent, or even intermittent. The functions of the stomach are generally impaired. The patient suffers from nausea and anorexia, and is liable to frequent attacks of vomiting. As the disease advances these symptoms become more strongly marked, and rigid contractions of particular muscles or groups of muscles are superadded to them, occasioning squinting, distortion of the features, difficult and indistinct pronunciation of particular letters or words, and sometimes great difficulty in swallowing. In some cases general convulsions, but generally stronger on one side of the body, may supervene. When the muscles of the extremities are the seat of this rigid contraction, the limbs assume a flexed position, from which any attempt to move them occasions great pain. The pupils of the eye are generally less sensitive than usual, dilated, or of unequal sizes, and the sight of one or both eyes is found to be impaired. In a still more advanced stage of the disease, the partial contractions of the limbs are exchanged for very extensive and constantly-increasing loss of power and sensation, all the senses fail, the sphincters are relaxed, and the patient sinks utterly helpless and exhausted.

The duration of this disease is extremely variable. It may assume from the first an acute character, and terminate fatally in a few days; or it may run a chronic course of several weeks, months, or years; or the chronic form may, at any time, be exchanged for an acute attack, with extensive inflammation of the membranes of the brain.

MORBID ANATOMY.—Variable; we may find one or more of the following conditions:—Congestion of the affected portion of the cerebral substance; hardening of its texture; white or red softening; small extravasated spots of blood; abscess or infiltration of pus, contiguous to inflamed or necrosed bone; encysted abscess; fatty degeneration, ossification, or aneurism of the vessels; gangrene; a cystic entozoon surrounded by inflamed brain tissue; scrofulous tumours. According to the proximity of the seat of irritation or inflammation to the membranes, these will be found implicated. The effusion of serum is an event common to several of these conditions. In certain cases we may trace the local disease to the impaction of one of the cerebral vessels by a portion of fibrine or of earthy matter derived from an aneurism or diseased cardiac valve.

CAUSES.—Some of those of encephalitis, such as the eruptive fevers and pyæmia. Scrofulous or syphilitic diseases of the bones of the head, blows on the head, entozoa.

DIAGNOSIS.—From general encephalitis, by the partial character of the rigidity, spasm, or paralysis. Only one side of the whole body, or only a particular limb or organ, may be thus affected. There may

be merely inequality of the pupils, or squinting of one eye and double vision, or slight deviation of the tongue or uvula from the median line. In another case, numbness and twitching of a single limb may be the only indication.

In forming our diagnosis of the exact seat of the disease attention must be paid to the following facts. 1. Disease of the right side of the brain produces paralysis, or some disorder of the left side of the body, and *vice versâ*. But this is not always true of the muscles of the face. According to Burdach, "In 28 cases of cerebral lesion of one side, the muscles of the opposite side of the face were paralysed; in 10 cases those of the same side. Paralysis of the muscles of the eyeball occurred in 8 cases on the same side, in 4 on the opposite."* The tongue is almost always paralysed on the side opposite to that of the face, and its extremity is pulled towards the paralysed side.

2. So long as the disease is confined to the white substance of the *cerebral lobes*, and does not cause pressure on the surrounding parts, its presence is not manifested by disordered nervous function.

3. Disease affecting the *right corpus striatum* produces paralysis of motion on the left side of the body (left hemiplegia), and *vice versâ*.

4. Disease of the *right optie thalamus* results in paralysis of sensation on the left side of the body, with more or less disorder of vision, and *vice versâ*.

5. Disease of the *right crus cerebri*, or *right half of the pons Varolii*, produces paralysis of motion and sensation on the left side of the body, and *vice versâ*.

6. A clot or tumour in the *centre of the pons Varolii* results in more or less complete paralysis of motion and sensation on both sides of the body, with disordered action of the muscles of the eyes and eyelids, and interference with auditory function.

7. Disease affecting the *right lobe of the cerebellum* causes disordered motion on the left side of the body, and *vice versâ*, accompanied by sensations of rolling in a particular direction, of going downwards or upwards, &c.

8. A clot within, or pressure upon, the *medulla* is manifested by some derangement of the functions of deglutition and respiration.

Paralysis due to disease of the spinal cord is distinguished at a subsequent page.

To return from these general considerations to a diagnosis of the particular nature of the cerebral disease:—If symptoms of encephalitic inflammation set in after chronic discharge of offensive matter from the ear, we may be pretty sure that caries of the petrous portion of the temporal bone has induced purulent inflammation of the contiguous part of the brain or its membranes.

When a delicate scrofulous child becomes sleepy, heavy, and listless, and gradually lapses into a state of unconsciousness, with partial convulsive twitchings or clenching of the hand, grinding of the teeth,

* Müller's Elements Physiol., translated by Baly, vol. i. p. 843.

squinting and uprolling of the eyes, we may generally conclude that a scrofulous tumour exists in the substance of the brain, or attached to its membranes.

Vertigo, sudden circumscribed pain in the head, followed by severe and repeated epileptiform convulsions have been caused by the *Cænurus cerebrealis*.

Chronic abscess of the brain substance progresses most insidiously. A lad, aged 14, fell and received a lacerated wound over the left frontal eminence. He was stunned for a few minutes, but soon recovered. Eight days after the accident he resumed work in a dyeing establishment, and continued it uninterruptedly until three days before his death. The wound cicatrised by the thirty-second day after its infliction, and during this period he walked every, or every other day half a mile to the Stockport Infirmary. Himself and his parents were frequently questioned as to the presence of any abnormal head symptoms; none, not even a trace of pain, were ever complained of; his health and spirits were apparently good, but he showed a little irritability of temper. He had usually attended the infirmary alone. On the thirty-ninth day his father came with him. He appeared pale and listless, and complained of pain in the epigastrium and sickness; he had passed urine involuntarily during sleep the preceding night, and he faltered once in walking to the infirmary, as if he had lost for a moment the use of his limbs. He again wetted the bed at night, and the next day lost the use of his right side. The following morning the power of deglutition was gone, and by 4 P.M. he had gradually lapsed into complete coma, with stertorous breathing, and a slow, laboured, irregular pulse. He continued in this state until 3.30 P.M. next day, and then died. A thick-walled abscess, containing six ounces of thick greenish matter, occupied the anterior lobe of the left cerebral hemisphere, distending the membranes. (J. H.)

Since abscess of the brain from external violence may thus insidiously progress under the eye of the medical practitioner, we can scarcely hope to receive timely intimation of the presence of the disease when it arises from some internal cause, unless, indeed, it involve one of the centres of sensation or motion, or the root of a particular nerve.

Local affections of the brain may be attributed to disease of the blood-vessels, when indicative symptoms arise in people beyond middle age, who present an arcus senilis, or whose external arteries are hard and tortuous.

PROGNOSIS.—Unfavourable in every stage of the disease, but especially when rigid contractions or paralysis have set in.

TREATMENT.—Will be indicated by the cause; that of encephalitis generally, but less active. Depletion when indicated should be practised with great caution, and rather by cupping and leeches to the temples or back of the neck, than by the lancet. Counter-irritants may also be prescribed with advantage, of which the best is a seton or issue in the inside of the arm. The rest of the treatment will consist in the daily use of gentle saline aperients, so as to keep up a con-

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stant free action of the bowels, a spare diet, and rest of mind and body.

In some cases mercury may be given so as slightly to affect the gums, with some prospect of advantage.

MENINGITIS—INFLAMMATION OF THE MEMBRANES OF THE BRAIN.

SYNONYM.—Arachnitis.

Under this head are comprised inflammation of the arachnoid and pia mater, usually designated *meningitis*; inflammation of the arachnoid alone, called *arachnitis*, and inflammation of the dura mater. Cases of pure arachnitis are of such extremely rare occurrence, and their symptoms differ so little, if at all, from those of mixed inflammation of the arachnoid and pia mater, that a separate description of the symptoms of arachnitis is alike difficult and unnecessary.

Inflammation of the arachnoid and pia mater commences differently in different cases. Sometimes it begins with sudden and violent pain in the head, with loud screaming, which is followed by convulsions. In other instances it also commences suddenly with a long-continued paroxysm of general convulsions. In a third class of cases its attack is less sudden, the convulsions being preceded for two or three days by a general feeling of discomfort, slight headache, nausea, and vomiting. The pulse is generally quickened, but sometimes natural in frequency, sometimes less frequent than in health. When the disease is fully formed, the leading symptoms are acute pain, often expressed by sharp, piercing cries, and increased by motion, intolerance of light and sound, grinding of the teeth, sleeplessness, furious delirium, a flushed face and suffused eyes. Twitchings and convulsions are commonly present, and sometimes strabismus; vomiting is a common symptom, and the bowels are obstinately confined; and the disease, when fatal, generally terminates in coma.

Inflammation of the dura mater sets in with pain in the head, fever, and rigors, which often recur at regular intervals, and simulate ague. The intellectual faculties are at first but little affected, but during the progress of the disease the patient often falls into a state of coma. If the inflammation extend to the other membranes, or to the substance of the brain, the symptoms proper to inflammation of those parts show themselves. This disease is rarely idiopathic, but follows on injuries to the scalp or skull, or on inflammation of the ear.

CAUSES.—The essential symptoms of meningitis, viz., intellectual excitement, and maniacal delirium, often occur during the progress of the infectious fevers. Meningitis is commonly the first result of exposure to the direct rays of a burning sun. The most common cause of the disease in childhood is the deposit of tubercle upon the surface of the membranes constituting the variety known as "Tubercular Meningitis." (See Acute Hydrocephalus.)

TREATMENT.—Distinguish the cause and treat accordingly. Against sunstroke (*Insolatio*, *coup de soleil*) the cold douche must be applied to the head; stimulants freely exhibited. The room should be darkened, and the head and spinal region blistered.

The meningitis of fever requires the treatment described under Typhus.

In tubercular meningitis we must be chary in the abstraction of blood; and, if we can do so with safety, avoid it altogether; otherwise we may treat it generally as recommended under Acute Hydrocephalus.

HYDROCEPHALUS—WATER IN THE HEAD.

VARIETIES.—1. Acute; 2. Chronic.

1. ACUTE HYDROCEPHALUS.

SYMPTOMS.—This disease, like inflammation of the brain and its membranes in the adult, begins differently in different cases. Sometimes it is preceded, for a considerable period, by languor, inactivity, loss of appetite, nausea, vomiting, parched tongue, hot dry skin, flushing of the face, and other symptoms of pyrexia, or by the symptoms of infantile fever. (See *Infantile Fever*, p. 368.) In a second class of cases, it begins suddenly with the symptoms of inflammation of the brain and its membranes. (See *Encephalitis*, p. 408.) In a third class of cases, again, it comes on, slowly and obscurely, in the course of febrile disorders or of the exanthemata.

The disease itself is characterised by acute darting pains in the head, with heat of scalp; great sensibility to light, suffused redness of the eyes, flushed countenance, and hot and dry skin. The pupils are contracted, and the brows knit. The patient is very restless, moans incessantly, tosses about, and rolls the head from side to side. The sleep is short and disturbed, and the patient often wakes screaming. The gait is tottering, and the hand is often raised to the head. The pulse is much increased in frequency, hard, and quick; the respiration is hurried, and interrupted by frequent sighs. The tongue is coated; there is nausea or vomiting; the bowels are either obstinately confined, or unusually loose, with foetid evacuations; and the urine is scanty, high-coloured, and turbid. Delirium and convulsions are sometimes combined with these symptoms of the stage of *excitement*. In infants there is at first strong pulsation of the fontanelles. Afterwards they become tense and bulged outwards.

After a variable, and often a considerable period, the violence of the symptoms begins to subside, the pain becomes less acute, the patient keeps up a low moaning; an uneasy sleepiness succeeds a constant state of watching; the pupils are dilated, and strabismus is often present; the muscles of the fore-arm are rigid and occasionally convulsed; the fingers are clenched upon the thumb; the pulse is now preternaturally

slow and often intermitting, but subject to great and sudden increase of frequency on change of posture; and the respiration is more frequently interrupted by deep sighs. The strabismus increases; the pupils become more dilated and cease to contract on being exposed to light; and double vision or complete loss of sight, with lethargic torpor, succeed.

After a shorter or longer continuance of the second stage, the pulse resumes its quickness, and becomes so extremely small and rapid as scarcely to be numbered: the respiration is difficult or stertorous; the limbs are convulsed or paralysed; the skin is covered with a cold sweat; the evacuations become involuntary; maculæ sometimes appear about the joints, and in different parts of the body; and at length the patient expires in dreadful convulsions, comatose, or exhausted.

Acute hydrocephalus in the adult. This is a rare occurrence, hydrocephalus being peculiarly a disease of infancy and childhood. But Herberden relates the following case:—‘An adult was seized with intolerable pain of the head, sometimes had a voracious appetite, and sometimes none; became delirious, convulsed, stupid, and died: the ventricles of the brain were found so distended with water, that as soon as a puncture was made the water flew out to a considerable distance.’

TERMINATIONS.—In slow recovery; in death; or in chronic hydrocephalus.

MORBID ANATOMY.—Sometimes enlargement of the head, separation of the sutures, and protrusion of the membranes. Serum, limpid or turbid, to the amount of several ounces, in the ventricles of the brain; softening of the surrounding cerebral substance; flattening of the convolutions; serous effusion beneath the membranes; the cortical texture of a pink hue, the sliced medullary matter showing great numbers of red points. The pia mater unusually vascular; the arachnoid opaque; minute semi-transparent or opaque bodies, single or in patches, in the substance of the pia mater, or larger portions of tuberculous matter from the size of a millet-seed to that of a pea deposited upon the surface of any of the membranes (*tubercular meningitis*).

CAUSES.—*Predisposing.* Infancy and childhood; debility; scrofulous diathesis. *Exciting.*—Intestinal irritation; dentition; metastasis of eruptions on the scalp or body; extension of inflammation from the ear; febrile and exanthematous disorders; premature application to study. *Proximate.*—In the greater number of instances tubercular deposits in the pia mater, giving rise to inflammation of the membranes.

DIAGNOSIS.—The most prominent symptoms are, the excruciating pain in the head, flushed face, restlessness, and fever; followed by strabismus, dilated pupil, and profound stupor; the pulse at first preternaturally quick, afterwards becoming inordinately slow or intermitting, and then, again, increasing in frequency. The tubercular nature of the disease may be suggested by hereditary tendencies, by the actual presence of tubercles in the lungs, or other manifestations of the scrofulous diathesis, such as enlarged cervical glands. It is necessary to dis-

tinguish this disease from one of an opposite character, called *spurious hydrocephalus*, which has the following characters: a *pale cheek*, a *cool or cold skin*, an 'expression of great languor, and an *absence of febrile symptoms*, or, at the most, an occasional and transient flushing of the face; to which may be added, in the case of infants, a sunken, instead of swollen fontanelle. On inquiry, the child will be found to have suffered from loss of blood, from long-continued diarrhœa, or from some other exhausting discharge.

PROGNOSIS.—Very unfavourable; especially if coma impend, if there be squinting, weak intermitting pulse, great enlargement of the head, apoplectic stertor, difficult respiration, and involuntary evacuations.

TREATMENT.—*Indications.* I. To subdue inflammation. II. To remove existing sources of irritation.

I. The inflammation is subdued by—

(a.) Abstraction of blood by venæsection, or by the application of leeches to the anterior fontanelle, temples, or back of the ears, or in adults by opening the temporal artery.

(b.) Cathartics; of calomel, with jalap or scammony.

Half a drop, or a drop, of croton oil is a sure purge, which may be disguised and given to children when other medicines are refused.

(c.) Antimonial preparations, which may be given in combination with preparations of mercury. Calomel, in doses of two or three grains, every two or three hours, either alone or in combination with tartar-emetic, in doses of one-eighth to one-sixth of a grain or more, is perhaps the best remedy. Children bear purgatives, and especially mercurial purgatives, well.

(d.) Cold applications to the head; by cloths wetted with cold water, vinegar and water, iced water, or the spirit lotion. Cold water dropped on the head, the head being slightly raised, and the effect of the cold to the head being increased by immersing the lower extremities, or the body of the patient, in warm water.

(e.) Counter-irritants, in the shape of mustard poultices or blisters to the thighs, chest, or back of the neck. *Croton oil liniment* ^{*olive oil*} *part croton*

II. The second indication is fulfilled by aperients and alteratives to free the alimentary canal and correct the secretions, and by the free use of the gum lancet, if the teeth be the source of irritation.

2. CHRONIC HYDROCEPHALUS.

SYMPTOMS.—Children are sometimes born with this disease. It rarely occurs in adult age. Several cases however are recorded. Dean Swift died of this malady. It takes place at all periods between birth and the age of eight, very seldom after. When it occurs after birth it comes on slowly and insidiously; or it follows the acute form. Its presence is indicated by drowsiness, languor, strabismus, vomiting, costiveness, coma, and convulsions; the bones of the head

separate, the fontanelles enlarge, and the head acquires an immense size. The patient may survive, in spite of immense enlargement of the head, for months or even years.

CAUSES.—*Predisposing.* Infancy; the scrofulous diathesis. *Exciting.*—Injury to the brain during labour; tumours within the cranium; the causes of other dropsies; dentition; irritation in the intestinal canal. It is also a consequence of the acute form.

DIAGNOSIS.—The history of the case, the large size of the head, and the prominence of the fontanelles.

Parents often express anxiety about the large size of their children's heads, and they are sometimes told that the enlargement is due to water in the head. As this question is often put to the medical man, it is well that he should be cautioned not to attribute a large head to this cause, unless the increased size is accompanied by other decided symptoms of the disease.

PROGNOSIS.—The disease generally ends fatally; though after the bones begin to separate, its fatal termination is protracted. Death is commonly preceded by convulsions.

TREATMENT.—*Indications.* I. To promote the absorption of the effused fluid. II. To improve the general health.

I. The first indication is fulfilled by—

(a.) Counter-irritants; blisters to the head, kept open for days or weeks by the unguentum cantharidis or the unguentum sabinæ; or frictions with tartar-emetic ointment; or an issue over the fontanelles. The anterior fontanelle has been punctured aside of the longitudinal sinus, and much serum withdrawn in several cases, but the results have not been such as justify the operation. Pressure by means of adhesive plaster, and the constant application of cold, may retard or altogether prevent the further effusion of fluid, until the sutures are well knit.

(b.) Mercury; applied externally, and given internally, so as to affect the mouth.

(c.) Diuretics of squills, digitalis, and submuriate of mereury, as recommended for anasarca.

II. The second indication is fulfilled—

(a.) By a careful regulation of the diet according to the age of the child. A light nutritious diet of sago, arrowroot, tapioca, and rice, with milk, and light puddings should be prescribed; and if there is great weakness, a teaspoonful of sherry or Madeira may be given at short intervals throughout the day. In *spurious hydrocephalus*, brought on by exhaustion, a nourishing diet, with a due allowance of wine, warm temperature, vigilant nursing, and the preparations of steel (of which the vinum ferri is the best), in doses proportioned to the age.

(b.) By tonics, such as quinine, and the preparations of iron.

(c.) By a change of air, especially if the patient live in a low and damp situation, to the sea-side, or a dry and bracing inland spot.

APOPLEXIA—APOPLEXY.

DEFINITION.—Sudden, and more or less complete loss of motion, perception, and sensation, caused by injurious pressure upon the brain substance with or without rupture of some of its fibres.

Varieties.—1. Simple or congestive apoplexy; *i. e.*, congestion of the vessels of the brain without rupture of blood-vessels; 2. Serous apoplexy, or congestion with serous effusion; and, 3. Hæmorrhagic apoplexy, or congestion with rupture.

SYMPTOMS.—This disease makes its attack in one of three ways:—
1. Suddenly, the patient falling down without warning, as if from a blow. 2. After a short premonitory stage, consisting of acute headache, sickness, and faintness. 3. With sudden hemiplegia.

In the first form of the disease, the patient falls to the ground, foaming at the mouth, his neck swollen, his face livid, his pupils dilated, and the mouth slightly drawn to one side. The urine and fæces are discharged involuntarily, the extremities are cold and livid, the skin bathed in a cold sweat, and death takes place in a few minutes, sometimes with, and sometimes without, stertor.

In whatever way it may commence, the fit is characterised by complete insensibility, accompanied by slow and noisy, or stertorous and puffing breathing; difficult deglutition; flushed and livid countenance; prominent and motionless eye, with, generally, a contracted pupil; the limbs are either motionless or rigid, or convulsed; or these several states exist only on one side, or in one limb. The bowels are either obstinately confined, or the evacuations are passed involuntarily; the urine also is either passed involuntarily, or, being retained till the bladder is full, dribbles away. The pulse is full, strong, and quick; but sometimes more and sometimes less frequent than natural.

In some cases of apoplexy the patient does not lose his senses entirely, but the organs of speech being paralyzed, he expresses himself by signs.

Apoplexy is sometimes preceded for a considerable period by premonitory symptoms, such as giddiness, headache, a sense of pressure and constriction in the head, confusion of ideas, incoherence, loss of memory, faltering speech, flushing of the face, hæmorrhage from the nose, flashes of light, noises in the ear, visual spectra, double vision, transient blindness or deafness, drowsiness, numbness of the extremities, pallor, nausea, vomiting, and faintness.

TERMINATIONS.—Suddenly in death. In death, after a variable interval. In complete recovery, which is commonly preceded by vomiting and profuse perspiration. In partial recovery, with more or less impairment of mind, and more or less extensive paralysis.

MORBID ANATOMY.—In *congestive* or *simple* apoplexy, distension of the vessels of the brain, with or without effusion into the ventricles, or at the base. In *serous* apoplexy, effusion of serum into the ventricles, or under the arachnoid, on the surface, or at the base of the brain. In *hæmorrhagic apoplexy*, effusion of blood into the substance of the brain, into the ventricles, at the base, or on the surface.

The softest and most vascular parts of the brain are those in which hæmorrhage is most liable to occur. In 444 cases tabulated by Dr. Aitken,* the hæmorrhage happened 268 times in the corpora striata; 39 in the thalami optici; 81 in the lobes of the cerebrum; 22 in the pons Varolii; and 34 in the other parts of the encephalon. Oftentimes we shall meet with evidence of a seizure previous to the fatal attack, such as a recent clot with circumscribed inflammatory softening of the nerve substance around it; or an old contracted colourless clot containing blood crystals; or a small cicatrised cavity containing a little serum.

DIAGNOSIS.—From the effect of spirituous liquors, by the odour of the breath. From the ordinary effect of narcotic poisons, by the history of the case. From both by some difference in the motor power of the two sides of the body; *e. g.*—one pupil may be contracted, and respond to the stimulus of light, when the other is dilated and immoveable; the muscles of the extremities on one side will generally be found perfectly flaccid, and the arm or leg falls from the hand like a mass of inanimate matter, while the muscles of the extremities on the other side will be found to possess more or less rigidity. If the limbs be convulsed, the movements on the two sides will on careful examination be found to be unequal. Sooner or later some such positive evidence of localised injury to the brain will be manifest. In order to make a correct diagnosis of the exact seat of injury, upon which alone we can form our prognosis, attention must be paid to the general facts enumerated in the diagnosis of partial encephalitis. (See p. 412.)

PROGNOSIS.—*Favourable.* Youth; slight impairment of the intellect and senses; hæmorrhage from the nose or hæmorrhoidal vessels; diarrhœa; profuse perspiration; a sudden attack, if not immediately fatal, as compared with an attack preceded by premonitory symptoms of long continuance; a pulse of natural frequency and character; natural breathing.

Unfavourable in proportion to loss of consciousness; a full, hard, jerking pulse; loud stertorous breathing, with a puffing out of the cheeks; repeated shiverings, followed by high fever; repeated vomitings; spasm, rigidity, or convulsions; involuntary evacuations; retention of urine; cold extremities; cold and clammy sweats.

CAUSES.—*Predisposing.* A certain age: from the fiftieth to the eightieth year: the liability increases as age advances. Few cases occur under twenty, and very few indeed in infancy and childhood. A certain make of body, combining a short thick neck, large chest, florid

* Science and Practice of Medicine.

complexion, and stout person ; but the disease often occurs in persons of the very opposite conformation. Hereditary tendency ; a sedentary life with indulgence in the luxuries of the table ; suppression of usual evacuations ; intense study ; plethora, however induced ; diseases of the valves of the heart preventing the free return of blood from the head.

These, however, are but remote causes of apoplexy ; the chief proximate cause is disease of the blood-vessels of the brain, the several stages of which appear to be fatty degeneration, atheroma, and ossification of their walls. (See page 492.) When the coats of the blood-vessels are thus diseased, they lose their elasticity and contractility, and become dilated and attenuated, and in this condition the least excitement of the circulation, causing increased fulness of the blood-vessels of the brain, leads to their rupture.

Exciting.—Violent exercise : strong expiratory efforts, as in singing and playing on wind instruments : straining at stool ; fits of coughing ; sudden emotions and violent passions of the mind ; exposure to intense cold or heat ; long stooping, or suddenly rising from the stooping posture ; pressure on the neck ; venereal excesses ; overloading the stomach ; intemperance ; narcotic poisons, such as opium ; suffocation by drowning, hanging, or strangulation, or by the narcotic gases, especially carbonic acid and carbonic oxide.

TREATMENT.—During or immediately after the fit, the first thing to be done, in all cases, is to loosen the patient's neckerchief and shirt-collar, raise his head, or place him, if convenient, in a chair, and open the window of the apartment. When the face is turgid and the eye injected, or, the face being pale, the pulse is full, hard, and jerking, we open a vein in the neck or arm, or partially divide the temporal artery, and allow the blood to flow till the approach of syncope, taking care that the patient does not faint. When, on the other hand, the face is pale, and the pulse feeble and intermittent, the patient must be treated as if he were in a fainting fit, and the bleeding must be postponed till decided reaction has occurred, and the symptoms just stated have shown themselves.

In the after-treatment, the *indication* is to reduce the action of the heart, and diminish the force of the circulation through the brain.

1. By bleeding from the arm at intervals, from a small orifice, in the semi-erect position, and with constant reference to the effect produced upon the pulse and aspect of the patient, whenever and so long as there are evidences of fulness of blood, or excitement of the circulation.

2. The application of leeches and cupping-glasses to the head and neck.

3. Drastic purgatives, of which croton oil, in doses of one or two drops, is the most easily used and most efficacious. Purgative enemata.

4. Cold to the head, if there be increased heat.

5. Blisters to the back of the neck, sternum, or legs, and, after a time, to the scalp.

6. A strict diet, consisting at first of simple farinaceous food, passing to a more generous diet cautiously and gradually.

7. If the disease take place soon after a full meal, an emetic must be employed; or an attempt must be made to evacuate the stomach by tickling the fauces with a feather.

When apoplexy arises from suppression of the menstrual or hæmorrhoidal flux, leeches should be applied to the vulva, or verge of the anus. When there is profound coma or collapse, we should apply irritating liniments to the legs, thighs, and neck; and if these fail, and life is nearly extinct, hot water may be poured over the extremities, or solution of ammonia applied to the nucha: the hot-air bath, or stimulants, in such cases, have produced reaction; and when this happens, depletion may be necessary.

When apoplexy supervenes after a retrocession of gout or of acute rheumatism, sinapisms, blisters, or hot turpentine should be applied to the affected joint: depletion in such cases is generally injurious.

If the patient swallow with difficulty, great care is required lest anything get into the glottis, and cause suffocation. While the difficulty lasts, medicines and nourishment should be brought into the smallest compass, and merely smeared over the lips and tongue. The bowels should also be relieved by purgative clysters.

In this disease, as in the last stage of typhus, we must examine the hypogastrium daily, and draw off the urine, if necessary.

When convalescence commences, we should regulate the bowels, insert an issue or seton in the neck, in the middle of the arm, or on the external surface of the knee. On the repetition of the fit, we must again resort to the treatment required in the first attack, but in a less active form. When a patient suffers from sleeplessness and great irritability, opium is the appropriate remedy: but it is contraindicated in the early stages of apoplexy.

In the treatment of apoplexy, in all its stages, it is important not to carry depleting measures to an extreme. An undue activity in this respect has doubtless led to fatal consequences. Severe antiphlogistic measures are also decidedly contraindicated in aged and feeble persons, in whom it will suffice to keep the bowels somewhat more open than usual, and to regulate the diet, avoiding, or prescribing, wine and other stimulants, according to the state of the system.

PROPHYLAXIS.—As apoplexy depends on a determination of blood to the head, and generally on a plethoric habit, persons predisposed to the disease should abstain from fermented liquors, observe moderation in the use of animal food, and carefully avoid all food difficult of digestion, or found to disagree. In some cases, a vegetable or a milk diet must be insisted on; and on the recurrence of threatening symptoms, a greater strictness of diet, and a more open state of the bowels; and if these do not remove the symptoms, dry cupping to the neck, or the abstraction of blood by cupping from that part, must be resorted to. Hot rooms and late suppers must be avoided. The patient should take regular exercise in the open air, be abstemious in his habits, keep the bowels free, and wear nothing tight about the neck or chest. When the disease occurs in persons of weak constitution a light nutritious

diet, with a moderate allowance of such stimulants as are easily tolerated, combined with astringent chalybeates or acid tonics, should be persevered in. Mental labour must be long abandoned and all excitement avoided. For the treatment of paralysis following apoplexy, see Paralysis.

CHRONIC DISEASES OF THE BRAIN.

There are several chronic diseases of the brain, such as softening, atrophy, induration, hypertrophy. The symptoms and diagnosis of these diseases are extremely obscure and uncertain, and the same symptoms may be present in very different states of the organ.

In many cases chronic diseases of the brain are unattended with any symptoms which could lead us to suspect their existence. Thus, we have it on the authority of Louis, that out of twenty cases of fungus of the dura mater, three only had cerebral symptoms of any kind: and chronic abscesses, hydatids, cysts, exostoses, &c., sometimes attain uncommon size, without any attendant symptoms of cerebral disorder.

Chronic Softening of the Brain.

SYMPTOMS.—Those of failing intellectual and physical powers, gradually lapsing into imbecility. The gait becomes shuffling and unsteady, the grasp weak, the speech thick and slow, the memory defective, and the animal functions torpid. A sensation of numbness and pricking affects the extremities of the weaker limbs. The radial and temporal arteries are seen and felt to be tortuous and hard. An “arcus senilis” frequently surrounds the cornea. The patient is liable to attacks of apoplexy. His spirits are usually depressed, and he sits down and sheds tears when he is unable to assign any cause for his grief. More or less paralysis generally accompanies this condition.

TERMINATION sooner or later in serous or sanguineous apoplexy.

MORBID ANATOMY.—Brain matter less vascular, softer and whiter than usual. Its softness is such that a gentle stream of water makes an impression upon it and after a time causes its diffuence. In extreme cases it is semi-fluid, and has little more consistence than cream. According to Dr. Todd, “the presence of great numbers of large cells, containing oily matter in large globules, and also in a state of minute subdivision, is characteristic of a state of white softening of some duration.”* In all cases the blood-vessels will be found diseased. The condition of the carotids at the termination near the optic foramina may be taken as an indication of that of its ramifications within the brain.

* Clinical Lectures.

Sometimes these primary trunks will be found dilated, thin, and stiffened here and there by patches of atheromatous deposit; sometimes they will be found converted into moniliform osseous tubes. If the softened brain-pulp be washed away a network of atheromatous or bony tubes will be left.

CAUSE.—Defective nutrition of the brain, resulting from disease of the coats of the blood-vessels. Partial softening is occasionally caused by the plugging of one of the large arteries or its branches by a portion of lymph detached from an inflamed cardiac valve, or by a small clot derived from an aneurismal sac.

PROGNOSIS.—Unfavourable.

TREATMENT.—Cold shower-baths, gentle exercise in dry temperate air, light nutritious albuminous diet, with a liberal allowance of wine. Dilute nitric and phosphoric acids in combination with bitter infusions, perchloride of iron and salts of zinc given for a week or two alternately. The patient should sleep with the head and shoulders slightly raised. All excitement, mental and physical, must be carefully avoided.

Atrophy.

Shrinking of the cerebral hemispheres with complementary effusion of serum around it, or within its ventricles, is a condition very commonly found in those who have been insane. The following case will serve to illustrate this condition :—

SYMPTOMS AND MORBID ANATOMY.—An active member of the bar died in his 56th year. He was naturally of a merry, vivacious temperament, but during the last five years of his life his health gradually failed without apparent cause, and he became fretful, gloomy, and impatient. He was apprehensive that some disaster was about to happen to him, and his manner was undecided, his speech rapid—I can hardly say imperfectly articulated, it was slovenly; his step was quick but shuffling. He complained much of debility, his grasp was weak; when sitting down his legs were constantly affected with tremor, and the body was occasionally tremulous also. He had lost sexual desire, and weighed several pounds less than he had done of late years; the skin was shrivelled, the countenance dusky-pale and haggard with an anxious look, lapsing occasionally into a vacant stare. He slept well, and appeared to be refreshed by sleep; the appetite was good, but the enjoyment of food was blunted; the bowels were rather torpid, but the evacuations were normal, as was also the urine. The tongue was clean, the pulse natural, but small and weak, the action of the heart normal, the head felt heavy, and there was tendency to sleep; the pupils were slightly contracted.

He attended his chambers regularly every day during office hours, but sat moodily in his chair, now sleepily nodding, now gazing vacantly into the fire or upon the carpet, and now standing in the middle of his room with his hands clenched in his hair, gnashing his teeth and cursing the day of his birth. "I eat, and drink, and sleep like a beast, and come down here day after day and month after month and do nothing: my mind is going from me. I cannot concentrate my thoughts upon any subject; I cannot understand or remember anything. If I read a short paragraph in the paper I don't understand it, and I cannot remember a line of it. My business is going from me. I shall die in a madhouse." These were his passionate expressions from day to day: his mind brooded on his condition and would turn to nothing else. Frequently he would tell me that I should find when I called next that he had committed suicide. He continued in this state for about four years. He exhibited no loss of memory until a year before his death, about which time he conducted a case in court very creditably. A month afterwards he came down to breakfast demented, and with the saliva flowing from the angles of his mouth. He remained in a state of quiet unconsciousness during the day, and then, under the influence of opium, recovered his speech imperfectly, but his memory was gone, and he became perverse and inclined to violence. After a fortnight he had returned to his previous condition, with the exception of great impairment of memory. For the last six months of his life he failed to recognize his acquaintances, and remained still in the same unhappy condition. During the last week of his life he had several epileptiform convulsions, and he ultimately died of asthenia. The calvarium was thick, the cerebral hemispheres shrunken, and the encephalon surrounded by a considerable quantity of straw-coloured serum. The *curia cerebri* seemed a little softer than natural; a slightly depressed mark, like a *cicatrix*, was seen on the surface of the left optic thalamus; the pituitary body was of fleshy consistence. The rest of the encephalon and upper part of the cord was firm and apparently healthy, as were the membranes.

The cause of the atrophic condition of the brain was obviously due to disease of the carotid arteries. These vessels within the skull were dilated to twice their natural size, and their walls were thin and stiffened with patches of atheroma. (J. H.)

Induration of the Brain.

Induration appears to be the result of chronic inflammation; the nerve tissue is harder and a little more vascular than usual. In some cases the hardening is considerable, and then the consistence of the brain is that of boiled white of egg, and it is pearly white and less vascular than natural. The induration may be partial or general. "In the progress of the disease convulsive movements are common, but paralysis does not appear to be so frequently present. The symptoms may go on for months and often remit, and are again aggravated by paroxysms."*

* Dr. Watson. See *Prac. Physic*, p. 422, vol. i., 4th ed.

Hypertrophy of the Brain.

SYMPTOMS AND MORBID ANATOMY.—The following case will serve to illustrate this condition of the brain:—S. C., aged 10, an intelligent little girl, had been declining in health for four months, becoming thin, pale, listless, and disinclined to move about; the appetite was defective and the sleep restless, the cervical glands slightly enlarged. She had convulsions during dentition, but was never laid-up with illness. Five days before death she complained of headache, and said the blaze of the fire and gas pained her eyes. During the three following days she evinced no symptoms of cerebral disorder. Two days before her death she complained of giddiness, and at 4 P.M. fell off her chair in an epileptic fit, which lasted a few minutes. The fits recurred at intervals during the next thirteen hours. She had six in all. In the intervals she was conscious when roused, but swallowed with some difficulty. The urine was passed involuntarily. The fingers of the left hand were loosely clenched over the thumb; the pupils were moderately dilated and active; pulse 120. The face was pale, but the head slightly warmer than natural. Diffusible stimulants were given, and the head was shaved and blistered. She died very composedly twenty-four hours afterwards. Head well formed and of natural size. On removing the calvarium, the dura mater appeared bulged and felt fluctuant, as if distended by a soft semi-fluid substance. On opening it the convolutions of the cerebrum were found greatly flattened; the ventricles were small, and contained no more fluid than was necessary to moisten them; the medulla was firm and healthy, and there was no effusion into the theca vertebralis. The membranes were perfectly smooth and healthy, and I readily stripped the dura mater off the floor of the cranial cavity in order to ascertain if the bones were free from disease. Every part of the brain appeared healthy; there was no deposit or local softening anywhere, but its consistence was not firmer than the brain of a child three or four years old. (J. H.)

CAUSE.—The scrofulous diathesis. All the sisters and the brother of the patient had swollen cervical glands; suppuration and ulceration had occurred in the eldest; and the brother, who is about three years older than the little girl that died, still has a protuberant mass of enlarged glands on the left side of the neck.

TREATMENT.—That of scrofula, with occasional blisters applied to the head, or a seton in the nape of the neck.

DISEASES OF THE SPINAL CORD AND ITS MEMBRANES.

MYELITIS	Inflammation of the Spinal Cord.
SPINAL MENINGITIS	Inflammation of the Membranes of the Cord.

OTHER DISEASES OF THE SPINAL CORD.

GENERAL REMARKS.—While *hemiplegia* is the most obvious symptom of lesion of the brain, *paraplegia* is the most striking characteristic

of injury to the spinal cord. In diseases of the brain the intellect and special senses are more or less implicated, in diseases of the spine they remain throughout altogether unaffected.

In the diagnosis of the seat of disease in the spinal cord, attention must be paid to the following facts:—

1. Complete transverse section of the posterior columns of the cord results in loss of power in regulating the movements of the parts below the section. Partial injury is followed by incomplete control over the muscular movements. Hyperæsthesia occurs in both cases in the parts below the section.

2. Transverse section of the antero-lateral column produces paralysis of motion in the parts below the section on the same side of the body.

3. Transverse section of the whole of the gray central nervous matter causes loss of sensation only in all parts below the section. Transverse section of the right half of the gray matter results in loss of sensation of the left limb below the section, and hyperæsthesia in the corresponding limb of the same side as that of the section, and *vice versa*.

4. Whence it follows that transverse section of one entire half of the cord causes in the parts below the section paralysis of motion with hyperæsthesia upon the same side, and loss of sensation only on the opposite side.

5. If the inflammatory irritation be present in the seat of the disease, the paralysed limbs will be contracted, and their muscles rigid. In non-inflammatory diseases, or when the inflammation has passed away, the muscles of the affected limbs will be flaccid.

MYELITIS—INFLAMMATION OF THE SUBSTANCE OF THE CORD.

SYMPTOMS.—Dull aching pain in the part affected, with some tenderness on pressure; loss of sensation and voluntary motion; or numbness and impaired sensibility, with feebleness of the upper or lower extremities, or of both, or of a single limb; or loss of sensation in one extremity, and of voluntary motion in another. The palsied limbs waste from inaction; but the reflex function remains intact. The muscles of the affected limb may be relaxed, contracted, or convulsed. There is no derangement of the intellectual faculties, unless when the inflammation extends to the brain. Sooner or later, in the course of the disease, retention or incontinence of urine comes on, the motions pass involuntarily, and bed-sores are formed on the back and hips. At last the patient sinks exhausted, or dies comatose from the extension of the disease to the brain. The symptoms vary with the seat of the disease.

When the cervical portion of the spine is affected, the superior extremities are paralysed, and there is difficulty in swallowing and in

breathing, and a sensation of tightness around the chest, and in the epigastrium. In some cases the pulse is very slow, and the patient is troubled with priapism.

When the dorsal portion is affected, the body is sometimes agitated by continued convulsive motions, and there are palpitations, difficult respiration, and sense of constriction in the abdomen.

When the lumbar portion is inflamed, the upper extremities and the breathing escape, but the inferior extremities are paralysed; and there is retention, followed by incontinence, of urine, and constipation, followed by involuntary evacuations from the bowels. Impotence is also a consequence (though not a necessary one) of disease of this portion of the spinal marrow.

In some cases the disease comes on insidiously, is unaccompanied by pain, and makes slow progress, but is finally succeeded by paralysis of the bladder, rectum, and inferior extremities.

MORBID ANATOMY.—Inflammation ending in hardening, creamy softening, or abscess of the cord, partial or complete.

CAUSES.—*Predisposing.* The adult age, and male sex.—*Exciting.* Blows and falls; violent exertions; exposure to wet and cold. Caries of the vertebræ; scrofulous disease. Venereal excesses.

DIAGNOSIS.—From other disease of the spinal cord, by the more complete loss of sensation in the paralysed parts. The gray matter is that part of the cord which transmits the sensitive impressions, and, being the most vascular part, it is most liable to be the seat of the inflammation.

PROGNOSIS.—Unfavourable. Complete recovery is rare; but the disease may become chronic, and life be prolonged for several years.

TREATMENT.—In the early stage, leeches or cupping to the part affected, followed by counter-irritation in the neighbourhood of the part, by blisters, issues, or setons, or by the tartar-emetie ointment. Aperient medicines; rest; constant attention to the state of the bladder, and scrupulous cleanliness, throughout the disease. The water-bed should be resorted to in the more severe cases, and especially where bed-sores are threatened. The rest of the treatment must be adapted to the existing state and strength of the patient.

SPINAL MENINGITIS—INFLAMMATION OF THE MEMBRANES OF THE CORD.

SYNONYM.—Spinal arachnitis.

VARIETIES.—1. Acute spinal meningitis. 2. Subacute spinal meningitis or spinal irritation. 3. Rheumatic spinal meningitis.

1. ACUTE SPINAL MENINGITIS.

SYMPTOMS.—Pain in the part affected, increased by motion, percussion, pressure, or heat. The pain, which often closely resembles that of rheumatism, and is brought on, or increased, by motion, extends along the back, and to the limbs, which are sometimes painful to the touch; or it shoots round the abdomen or chest. There are contractions of the back and neck, and of the limbs, varying with the seat of the disease, and assuming the form of trismus, torticollis, partial or complete opisthotonos, or general tetanic spasms. Sometimes, in the place of tetanic spasms, there are convulsions, or the symptoms of chorea. There is a sense of constriction in the neck, abdomen, or chest, with urgent feelings of suffocation. In some cases the urine is retained and the bowels are confined.

The progress of the disease is rapid, and it generally proves fatal from the tenth to the fourteenth day, with delirium, coma, or typhous symptoms.

MORBID ANATOMY.—Inflammation of the arachnoid and pia mater, with effusion of serum under the sac of the arachnoid, or in the wide subarachnoid space between this membrane and the pia mater. In some cases inflammation and its consequences in the cord itself.

CAUSES.—Those of inflammation of the substance of the cord.

DIAGNOSIS.—From lumbago and psoas abscess, by the tenderness on pressure over the spinous processes, and by the rigid spasm or convulsions, and in many cases by the affection of the bladder.

PROGNOSIS.—Less unfavourable than where the substance of the spinal marrow is inflamed; but attended with considerable danger.

TREATMENT.—Venæsection, leeches, and cupping to the part affected, followed by active aperients, a strict antiphlogistic diet, and perfect rest, in the recumbent posture. The state of the bladder should be ascertained, and the urine, if necessary, frequently drawn off. After general and local bleeding, the application of bladders of ice to the affected portion of the spine is likely to be attended with great benefit. Counter-irritants may be, at the same time, applied in the neighbourhood of the part. Benefit will also be derived from the use of mercury, so as to affect the system. If collapse supervenes, the strength must be supported by diffusible stimuli and by stimulating injections.

When the disease becomes chronic, and there is paralysis with shaking or stiffness of the limbs, counter-irritation by issues, setons, and moxas may be practised with advantage.

2. SUBACUTE SPINAL MENINGITIS—SPINAL IRRITATION.

SYMPTOMS.—Pain in the affected portion of the spine, increased by firm pressure, percussion, or heat. Pain in the left side, or under the false ribs, or in all the muscles of the chest, or muscular pain of the

most acute kind over the whole of the abdomen. Shortness of breath, and palpitation of the heart. Hysteria, nervousness, depression of spirits, irritable temper, disordered bowels, constipation, flatulence, and deficient, excessive, or depraved menstruation.

Sometimes these disorders, which are often of long continuance, are aggravated after marriage, but especially during lactation and pregnancy; the sufferer is constantly complaining of pains or unpleasant sensations of all parts below the affected vertebræ.

On making firm pressure with the index and middle finger of the right hand on the vertebræ from the neck to the lumbar region, or striking the several vertebræ successively, we discover one or more painful points. On striking the vertebræ, the pains in the side, chest, or abdomen are immediately increased; or darting pains in those parts are produced, if they did not previously exist. In some instances these superficial pains are accompanied by convulsive movements of the muscles of the trunk.

CAUSES.—*Predisposing.* The female sex. It is common in young females, and is sometimes associated with distortions of the spine.—*Exciting.* Sedentary pursuits, tight lacing, want of active exercise, constipation, painful menstruation, leucorrhœa; the original cause and the effect continuing to react upon and increase each other. Spinal irritation may exist in other diseases, as in spasmodic asthma and chorea. When the symptoms associated with spinal irritation are more severe than those now described, the disease belongs more properly to acute meningitis.

RATIONALE.—The tender state of the spine is the middle link between some remote irritation of the uterus or intestinal canal, and the pains in the muscles of the chest or abdomen. The irritation travels through the nerves of the part affected to the spine, where it first becomes sensible, and thence is reflected as pain to the muscles of the chest or abdomen. The connection of the muscular pain with the tender spine is evidenced by the effect of percussion of the spine in producing or increasing it; and where convulsions are combined with the pain, those convulsions are also produced by striking the spine. In the more severe cases of spinal irritation, which closely border on acute spinal meningitis, pressure on the spine causes both acute pain and violent convulsive or tetanic movements, and the slightest pressure on the site of the reflected pain will also cause convulsions. Pressure or percussion upon other parts of the skin, or on the spine above or below the affected portion of the spinal cord, are unattended either by pain or convulsions. (G.)

DIAGNOSIS.—From general cutaneous tenderness, by the absence of pain on pressing the base or spine of the scapula, or other projecting portion of bone.

PROGNOSIS.—*Favourable.* The disease is generally amenable to treatment. If neglected, it may pass into the acute form, and so prove fatal.

TREATMENT.—*Indications.* I. To subdue the tenderness of the spine. II. To remove its cause. III. To relieve the muscular pain.

I. The first indication is fulfilled by the application of leeches or cupping-glasses to the tender part of the back, followed by blisters or the unguentum antimonii tartarati; and in less severe cases, by the antimonial ointment alone. In cases of extreme tenderness, a drachm of the pulvis opii may be added to the ointment.

II. The second indication requires aperients, alteratives, and tonics adapted to the particular disorder of the bowels or uterus.

III. The third indication is fulfilled by hot fomentations, or by the emplastrum opii, or the emplastrum belladonnæ, applied to the part affected.

In most cases of simple spinal irritation, without deformity, a cure is effected by counter-irritation, with or without local depletion, a course of aperient medicines, and attention to the general health.

3. RHEUMATIC SPINAL MENINGITIS.

SYMPTOMS.—Diffused pain, often very acute, and accompanied by tenderness in the neighbourhood of the spine; with severe neuralgic pain extending the whole length of one arm or leg, according as the disease attacks the lower cervical and upper dorsal vertebræ, or those of the loins. After a time the pain and tenderness become limited to a single spot near the spine, on one side, which is found on examination red and tender, and, after a while, may become the seat of an herpetic rash. The pain in the extremity continues, and is attended with numbness and tingling of the fingers, with loss of power, or complete paralysis. It occasionally comes on in paroxysms, and is accompanied by spasmodic contractions of the limb, attended with chronic or epileptiform movements.

PATHOLOGY. — Rheumatic affection of the fibrous tissues of the spinal sheath, and of the tendons of the neighbouring muscles; with cutaneous inflammation of limited extent.

CAUSES.—*Predisposing.* Those of rheumatism and gout.—*Exciting.* Exposure to cold and wet. Fatigue. Constrained posture.

DIAGNOSIS.—From muscular rheumatism by the local pain, and tenderness, and loss of power in the limb.

PROGNOSIS.—Favourable, but guarded.

TREATMENT.—Leeches to the tender spot, followed by warm fomentations; and colchicum (Vin. colch. ℥xx.) with opium (Tinct. opii, ℥v. vel x.) in a saline aperient three times a-day. The recumbent posture, or efficient support for the back.

OTHER DISEASES OF THE SPINAL CORD.

Serous effusions occur within the spinal canal, as well as in the skull, and may be situated externally to the dura mater, or within it, or beneath the arachnoid membrane.

Extravasation of blood may occupy the same situations. It may be induced by falls, blows, slips, or other injuries to the spine, or by violent efforts, as pulling on boots, drawing a cork, or raising a heavy load. Effusions of blood, (spinal apoplexy) have also been found in cases in which no accident had occurred; the symptoms being pain in the back, spasmodic contractions of the muscles, paralysis of the bladder, rectum, and lower extremities, convulsions, or coma, and death.

The membranes of the spinal cord may be thickened and indurated like those of the brain, and from the same causes; and fungous growths form on the dura mater, causing pressure and paralysis.

The substance of the spinal cord may also become firmer than natural, after congestion or inflammation. It is subject, in common with the brain, to atrophy and hypertrophy, to tuberculous deposits, and carcinomatous degeneration, to hydatids and to aneurismal and other tumours.

The diagnosis of all these organic affections is very difficult and uncertain, the prognosis unfavourable, and the treatment chiefly palliative. When accompanied by decided marks of inflammation of the substance of the cord, the treatment is that of Myelitis.

The spinal marrow is also liable, like the brain, to *concussion* and *compression*, induced by external injuries, whether inflicted on the back or by falls on other parts of the body. In severe concussion, reflex motions of the limbs cannot be excited. The treatment is similar to that employed in the same diseases of the brain.

A congenital malformation, known as *Hydrorachis*, or *Spina Bifida*, sometimes comes under the notice of the physician. It consists in one or more fluid tumours on the lumbar, dorsal, or cervical vertebræ, which communicate with the spinal canal. The tumour varies in size, is often transparent, and the colour of the skin may be natural, reddish, or livid. If pressure be made on the tumour, it induces signs of compression of the brain. The limbs are imperfectly developed, and the rectum and bladder are often paralysed. The skin may be absent, and in this case the tumour is covered by the dura mater, pia mater, and arachnoid membrane; and the pia mater is congested and red. In this disease the spines, and usually the laminae of the corresponding vertebræ are wanting. In some cases the spines are separated along the median line and are with the laminae widely divergent. Occasionally there is a division of the medulla, or it is entirely absent at the seat of the tumour. The cavity of the arachnoid contains a serous, transparent, sanguinolent or purulent fluid. The fluid may communicate with the brain; or be merely enclosed in the pia mater.

Attempts have been made to treat these tumours by pressure, or by pressure with repeated tappings with a fine needle; but experience has proved that both plans are ineffectual. The tumours, when the integuments are wanting, or very thin, should be protected by a shield.

DISORDERS OF THE NERVES OF SENSATION.

NEURALGIA	Nervous pain.
NEURALGIA FACIEI	Tic Doloieux.
NEURALGIA HYSTERICA . .	Hysterical pain.
HEMICRANIA	(See Cephalagia, p. 405.)
SCIATICA	Pain in the sciatic nerve.
ANÆSTHESIA	Loss of sensation.
ANÆSTHESIA FACIEI	Numbness of the face.

NEURALGIA—NERVOUS PAIN.

Pain is a symptom of almost all acute, and many chronic, diseases: it is also a distinct affection of the nerves themselves. The term neuralgia is applied to the latter form. It may have its seat in any of the nerves of common sensation, and in some instances affects those of organic life.

Neuralgia may arise from many causes. It is a common consequence of debility following prolonged lactation, long-continued and excessive discharges, or exhaustion from loss of blood. It also occurs in anæmia. In another class of cases it is confined to one side of the head and face, and assumes an intermittent character, and may often be traced to the same cause as ague. In many instances, pain is due to some remote irritation, and is termed sympathetic. Examples of sympathetic neuralgia are the pain in the shoulder, so common in affections of the liver, and pains in the upper arm in certain cases of diseased heart. Here there is a well-known connection between the nerves supplying the diseased organ and those going to the seat of pain. In other instances of sympathetic neuralgia no such connection exists. Thus, common tic doloieux has been distinctly traced to acidity of the stomach, to an overloaded state of the intestines, or to diseased kidney. Another class of cases may be traced to pressure or irritation at the root of the nerves supplying the seat of pain. A spicula of bone, or a fragment of a foreign body, irritating the nervous trunk, is a common cause of severe and inveterate forms of neuralgia. Examples of the same form of disease are, pain in the glans penis from stone in the bladder, pain of the thigh and testicle from irritation of the kidney, pain in the back of the thigh and leg, and at the verge of the anus, from constipation. Distension of the hollow viscera by gas, as in colic, and in severe flatulence, are other examples of neuralgia from pressure. Another interesting and important class of pains are *reflected* pains, gene-

rally situated in the parietes of the chest or abdomen, and very frequently in the left side. (See Spinal Irritation, p. 429.) Pains of the internal viscera, without symptoms of inflammation, form another class of neuralgic affections. Intense neuralgia of an intercostal nerve generally precedes or accompanies herpetic eruption of the side. Gastrodynia, enterodynia, and hysteralgia, are examples of pain in the organic nerves of the stomach, intestines, and uterus. Wandering pains in the muscles are common in aged persons, and in younger men through hard work, or after severe illnesses. Inflammation of the neurilemma, another cause of neuralgia, combines heightened sensibility with pressure. In some cases, though the cause of the pain seems to be in the nerve itself, no change of structure can be detected.

NEURALGIA FACIEI—TIC DOLOREUX.

DEFINITION.—Pain, often with intervals of perfect freedom, in some or all of the branches of the sensitive portion of the fifth or trifacial nerve.

SYMPTOMS.—The disease generally occurs in middle-aged adults, and affects both sexes, consisting in most acute pain coming on at variable intervals, suffering considerable abatement, or entirely disappearing without assignable cause for days, weeks, months, or even years together. The pain is at first confined to a limited spot, the supra-orbital, the infra-orbital, or the mental foramina, its most frequent seat being the right infra-orbital nerve. It is of the acute lancinating kind, compared to electric shocks, or it is a severe burning sensation. Sometimes pain is the only symptom, but generally there is some determination of blood to the affected part, and it becomes swollen. If the eye be affected, there is a large secretion of tears; if the mouth or jaw, a copious flow of saliva. After it has continued some time, it is apt to involve other branches of the nerve first affected. Thus, if it begin beneath the orbit, it spreads to the upper lip, and thence to the upper and lower jaw; and it may mount over the orbit, extend over the entire scalp, and even for some distance down the spine. The general health is very little affected; the patient, in spite of the most intense suffering, recovers his flesh and healthy aspect in a few days of intermission, and often attains a very advanced age.

CAUSES.—*Predisposing.* The female sex; the state of pregnancy; the nervous temperament; the anæmic state; delicate health; morbid depression through fear, grief, or anxiety.—*Exciting.* Irritation of the root of the nerve within the cranium, or of one of its branches, from inflammation of the peridental membrane, or a carious tooth; or from pressure in the bony canal in which the branch lies. Rheumatic affection of the nerve. Remote organic disease, especially disease of the kidney.

DIAGNOSIS.—From *hemicrania*, by the pain not being intermittent ; and, in general, by its more limited extent. From *brow ague*, by the seat of the pain, which is generally beneath the eye.

PROGNOSIS.—Generally *unfavourable*, when it is of long standing, and cannot be traced to any distinct cause. Functional disease, or a state of health admitting of improvement by medical treatment, is ground for a *more favourable* prognosis. The disease is rarely fatal, and sometimes disappears in old age.

TREATMENT.—Our first care must be to determine, as well as we are able, whether the pain be due to local irritation. The sensitive branches of the trifacial nerve are peculiar in passing through long bony canals, and in being distributed to the teeth. Hence we must look for pressure, for inflammation of the peridental membrane, and for caries of the teeth. Stumps and carious teeth should be removed. If the pain be due to rheumatic affection of the sheath of the nerve, or of the periosteum lining the bony canals in which its branches run, it may be expected to yield to alkalies, colchicum, or iodide of potassium. If the irritation be reflexed from the stomach, bowels, or kidneys, we must apply remedies for indigestion, constipation, and the renal affection.

When the pain arises from constitutional disorder, our treatment must be directed to its removal. In the anæmic condition, quinine and iron, alone or in combination, are generally successful. The best way of administering the quinine is in full and occasional doses. The most suitable form of iron is the saccharated carbonate and the peroxide ; they may be given in doses of gr. xxx. to ℥ss.* twice or thrice a day.

Hydrochlorate of ammonia in gr. xxx. doses thrice a day, as recommended by Dr. Watson, is occasionally very successful, especially when the pain is confined to the jaws.

The following local applications may be required in addition to the constitutional treatment :—1. The inhalation of a little chloroform. 2. Linimentum chloroformi, linimentum belladonnæ, or a mixture of equal parts of chloroform and laudanum may be rubbed into the gums, or over the painful nerve. Veratria and aconitia ointments are often very serviceable.

In a case of tic doloureux of many years' standing, which had spread from the infra-orbital nerve to the upper and lower jaw, over the scalp and down the spine, accompanied by the most excruciating suffering, after tonics and narcotics, bleeding, blistering, and salivation, had been tried in vain, and nothing afforded any relief, a stream of cold water poured upon the forehead, and allowed to trickle over the face and neck, procured refreshing sleep after the lapse of about five minutes, had the same effect on a repetition, was followed by the first good night the patient had had for weeks, and by a long interval of comparative ease. In this case the paroxysms are always accompanied with determination of blood to the parts affected, with increased heat of surface. Where these characters are absent, cold may be expected to prove less efficacious. (G.)

* ℥i = 100 grains.

To cure toothache. Melt some solid carbolic acid. Dip a little cotton wool in it & put the pledget in the cavity of the tooth. Instant relief.

NEURALGIA HYSTERICA—HYSTERICAL PAIN.

[Women of hysterical temperament are often subject to severe neuralgia. It may affect any part of the body. It often assumes the form of tic. Occasionally it has its seat in a particular joint or bone. There may be no evidence of local or constitutional disease. The pain appears in many cases to be purely imaginary; in all it is more or less superficial, and is absent or diminished when the patient's attention is diverted from it. Rough handling gives no more pain than the slightest touch, but of the reality and occasional severity of the disease there can be no doubt. In one case which came under my notice, a healthy unmarried woman of about forty years of age complained of intense and constant pain in one knee; there was no evidence of the least disease. Every kind of counter-irritation and constitutional treatment was adopted. After repeated treatment as an in-patient of the infirmary, the surgeon at last yielded to her importunities, and amputated the leg. The knee-joint was perfectly healthy, and no disease of its nerves could be detected. Two years afterwards, she came again and again under treatment as an out-patient for similar pain in her other knee. She entreated the surgeons one after another to amputate this leg also, but they did not yield a second time to her solicitations.

In another case the pain was limited to a small spot in the front part of the tibia; the pain was so acute that the surgeon supposed there was an abscess in the bone, and trephined it accordingly. All appeared healthy, however. Soon after the operation the pain returned in the part, and continued for more than a year, at the end of which time the surgeon yielded to her wish, and amputated the leg. No cause for the pain could be detected. These cases serve, I think, to show that the pain, originating perhaps, in the first instance, in some trifling or even imaginary disorder of sensation, is eventually real and severe; and they serve, at the same time, to remind us that there are certain affections of the nervous system, of the causes of which we are as yet ignorant. The shower-bath as a constitutional remedy, and the light application of the actual cautery in lines to the affected part, are the most hopeful means of relieving the affection.] J. H.

SCIATICA.

SYMPTOMS.—Acute aching or darting pain extending along the course of the sciatic nerve from the nates to the knee, and in some cases to the ankle. The pain is generally increased by firm pressure in the course of the nerve.

CAUSES.—The pressure of accumulated fæces, or of tumours in the course of the nerve. Syphilitic or rheumatic affection of the sheath of the nerve.

DIAGNOSIS.—From *muscular rheumatism* by the pain being limited to the course of the nerve, and being little, if at all, affected by the motion of the limb. In sciatica dependent on constipation, the pain is generally increased by every effort to relieve the bowels.

PROGNOSIS.—With the exception of cases dependent on constipation, the disease is often very obstinate, and difficult of cure.

TREATMENT.—After unloading the bowels completely by the repeated use of aperients, the abstraction of blood by cupping or leeches applied to the nates, or to the back of the thigh, in the course of the nerve. Dry cupping in the weak and aged. The warm or vapour bath. Friction. Aperient medicines so administered as to keep the bowels free. The general and local remedies recommended in neuralgia faciei.

I have seen several cases in which no relief had been obtained by the use of remedies adapted to the cure or relief of neuralgic pains, speedily and completely cured by the compound colocynth pill, given for a few nights, followed by a black draught in the morning. (G.)

ANÆSTHESIA—LOSS OF SENSATION.

VARIETIES.—*Anæsthesia*, paralysis of the nerves of sensation; *amaurosis*, of the retina; *cophosis*, of the auditory nerves; *anosmia*, of the olfactory nerves; *ageusia*, of the gustatory nerves.

Anæsthesia, or loss of common sensation, may occur separately or combined with palsy of the voluntary muscles; it may be universal or partial, confined to one side or extending to both, and it may affect any part of the body. Facial anæsthesia is a well-known form of this disease. Numbness, with loss of power in the hands and forearms, is not an unfrequent symptom in *mimosis inquieta*. (See p. 292.)

The **TREATMENT** must depend entirely on the pathological condition by which the disease is induced—if by pressure, the cause must, if possible, be removed; if by deficient supply of blood, stimulants must be resorted to; if by cold, the circulation must be restored. In other cases the treatment will be that of the other diseased conditions with which it is associated. It rarely presents itself for treatment as a separate malady.

ANÆSTHESIA FACIÆ.

SYMPTOMS.—Numbness or total loss of sensation in the forehead, cheek, nose, and chin, on one side of the face; also in the lips, tongue, inside of the mouth and nose, and surface of the eyeball, generally accompanied by paralysis of the temporal and masseter muscles on the

same side. This loss of sensibility is sometimes attended by intense pain of the parts affected.

TERMINATIONS.—In some cases ulceration of the cornea and destruction of the globe of the eye.

PATHOLOGY.—Injury to the fifth pair of nerves by disease, compression, or mechanical injury.

PROGNOSIS.—*Favourable*, in the absence of anæsthesia or palsy of other parts. *Unfavourable*, if complicated with disordered functions of other cerebral nerves, or with symptoms of disease of the brain.

TREATMENT.—Local depletion by cupping or leeches to the temples, followed by fomentations. The internal use of mercury, so as slightly to affect the gums. If the disease, in spite of this treatment, become chronic, small blisters in front of the ear, kept open by savin ointment.

DISEASES AFFECTING THE NERVES OF VOLUNTARY MOTION.

PARALYSIS	Palsy.
LEAD PALSY	Dropped hand.
TREMOR MERCURIALIS	Mercurial tremors.
PARALYSIS AGITANS	Shaking palsy.
EPILEPSIA	Falling sickness.
CATALEPSIA.	Catalepsy.
CHOREA	St. Vitus's Dance.
TETANUS	Locked jaw.
HYSTERIA	Hysterics.
HYDROPHOBIA	Canine madness.

PARALYSIS—PALSY.

Paralysis, although only a symptom of disease, may, like dropsy, be conveniently considered under a distinct head.

VARIETIES.—1. Hemiplegia; 2. Paraplegia; 3. General Paralysis; 4. Partial Paralysis (including Paralysis of the Facial Nerve, Ptosis, &c.); 5. Lead Palsy; 6. Paralysis of the Insane.

1. HEMIPLEGIA.

DEFINITION.—Loss of motion, or of motion and sensation, of one lateral half of the body.

VARIETIES.—The late Dr. Todd distinguished five varieties of hemiplegia, viz., Cerebral, Spinal, Epileptic, Choreic, Hysterical, and Peripheral.

SYMPTOMS.—In cerebral hemiplegia, the limbs of the affected side, if raised, fall by their own weight; the face on the same side is relaxed

and void of expression, and drawn to the sound side; the tongue, when protruded, is thrust towards the palsied side; the speech is either lost, or it is thick, muttering, and unintelligible. In rare instances, the mouth is drawn to the affected side, and the tongue protruded towards the sound side. Digestion is more or less interfered with. The loss of power is generally accompanied by loss of sensation, but in a few instances with heightened sensibility; the temperature of the affected side is generally much lower than that of the sound side, but occasionally it is raised above it. The mental faculties are sometimes unimpaired; but they generally suffer, as shown by impaired memory, confusion of thought, loss of power of attention, change of character, irritable temper, and depression of spirits. The pulse is often infrequent, but sometimes above its usual standard: the respiration also is slow. The bowels are generally inactive. If the patient do not speedily recover, the palsied limbs shrink and grow cold. When the disease is partial, the arm is more commonly affected than the leg. If the power of the limbs be impaired, but not lost, the arm will be raised with difficulty, and often not without the assistance of the other, the hand cannot grasp firmly, the leg will be dragged after the sound limb, and in walking the patient will be very liable to trip. In cases of recovery the leg regains its power first; so that the patient can walk about, while the upper extremity still remains palsied; but to this rule there are many exceptions. (Heberden.)

Hemiplegia is most common on the left side. It usually comes on suddenly, constituting the "paralytic stroke." Occasionally it comes on gradually.

Spinal Hemiplegia.—In this form the face and intellect are unaffected. It is a very rare variety.

Epileptic hemiplegia. "After an epileptic fit, one half of the body, generally that which was more convulsed than the other, occasionally remains paralysed for a few minutes to a few hours, or for three or four days, or even much longer. It then goes off, or improves until the next epileptic fit."*

Choreic hemiplegia sometimes occurs on that side of the body which was most affected by the choreic movements when these have ceased.

"In *Hysterical hemiplegia* neither the face nor the tongue is affected; the palsy is limited to the upper and lower extremities, and is often not complete; the muscles are generally relaxed and do not suffer much in their nutrition. In walking, the palsied leg is drawn along as if lifeless, sweeping the ground."*

Peripheral hemiplegia.—Dr. Todd has given this term to those partial paralytic affections which commence with sensations of "needles and pins" in the fingers or toes, and gradually creep upwards, and more or less completely involve the extremities. The affection is occa-

* Clinical Lectures by Dr. Todd, edited by Dr. Beale.

sionally paraplegie. He believes it to be identical with what Dr. Cheyne has called *Creeping palsy*.*

CAUSES.—Sudden and *complete* hemiplegia, or the “paralytic stroke,” is invariably caused by an apoplectic seizure. Whenever the right corpus striatum, or any portion of the motor tract intervening between it and the medulla oblongata, is ploughed up by sanguineous effusion, or subjected to pressure from effusions or tumours in its neighbourhood, complete hemiplegia of the left side of the body must of necessity result. If the disease have come on slowly, it is the result either of a growing tumour or of softening of the nerve tissue. In the latter case, it is possible that a weakness and numbness of the one side of the body may suddenly lapse into a complete hemiplegia from sudden lesion of the softened fibres without attendant hæmorrhage.

Incomplete hemiplegia is the result of pressure or lesion of one side of the spinal cord, immediately below the decussation of the antero-lateral columns. The paralysis of motion is on the same side as the lesion, the paralysis of sensation on the opposite side.

DIAGNOSIS.—Even in mild cases, cerebral hemiplegia is always associated with more or less paralysis of the face and tongue. In more severe cases the intellect is disturbed, speech is imperfect or obsolete, deglutition is more or less difficult.

In spinal hemiplegia, the head, face, and tongue are unaffected, and sensation is impaired on the opposite side of the body to the paralysis of motion.

Epileptic hemiplegia is of cerebral origin, and may be known by the history of the case.

Choreic hemiplegia is usually associated with some slight jerking movements of the paralysed limbs; the face is unaffected; the tongue does not deviate, and is usually protruded and withdrawn in a characteristic manner. Moreover, the history of the case will serve to guide us.

Hysterical hemiplegia is known by “the sweeping movement of the lower limb, and the absence of face and tongue palsy. There are likewise no reflex motions.”*

PROGNOSIS.—*Favourable.* A recent, partial, and incomplete attack, without cerebral symptoms; youth. If attended by anæsthesia, a return of sensation, tingling, and increased temperature.—*Unfavourable.* The disease extensive, of long standing, without perfect loss of power, and occurring in advanced life.

With a view to more correct diagnosis and prognosis, the late Dr. Todd arranged cases of cerebral hemiplegia into three classes. 1. Those in which the muscles of the paralysed limbs are completely relaxed, the limbs being loose and flaccid, and the muscles wasted; 2. Those in which the paralysed muscles exhibit a certain amount of rigidity existing from the moment or soon after the attack. The muscles retain

* Clinical Lectures by Dr. Todd, edited by Dr. Beale.

their plumpness and the limbs resist extension. 3. The cases in which the wasted and relaxed muscles gradually acquire, after some time, more or less of tension, becoming shortened and feeling like tight cords. For these various states of the muscles he has drawn inferences as to the nature of the lesion. The phenomena presented by the first class result, he considers, from white softening of the brain. The phenomena of the second class are caused by the irritation of healthy brain tissue in the neighbourhood of the clot at the time of its formation, and subsequently during its absorption and the contraction of the wound. The muscular phenomena of the third class result from lesion of softened nerve-fibres, with or without the formation of a clot, the late rigidity resulting from the irritation caused by slow cicatrization of the wound, the process being attended by a dragging upon the healthy brain-substance in its neighbourhood, and the irritation thus set up being conveyed to the muscles, results in a corresponding gradual contraction of them.

2. PARAPLEGIA.

DEFINITION.—Loss of motion, with more or less impairment of sensation of both sides of the body. Only the lower half of the body may be affected, or the whole of it except the head may be involved, or the paralysis may be general, affecting the head also, when general paralysis with complete insensibility (coma) results.

The term paraplegia is usually limited to paralysis of the lower half of the body, but for the sake of simplicity we here give it its unrestricted signification.

VARIETIES.—1. Organic, functional, or reflex. 2. From constitutional disorder.

SYMPTOMS.—Like other forms of paralysis, organic paraplegia may occur either suddenly or gradually. Sometimes it is complicated with head symptoms, but more frequently these are absent. The extent of the paralysis will depend upon the seat of the lesion. (See page 427.) When the disease affects the lower part of the spinal cord, and the paralysis is complete, there is entire loss of sensibility and motion in the lower extremities, with paralysis of the bladder and rectum. The patient being confined to the horizontal position, the back and sacrum are apt to slough. The retained urine is generally highly ammoniacal, and is prone to form calculous deposits. It ultimately becomes bloody.

In less complete forms of paraplegia, there is weakness of the lower extremities, with a sensation of stiffness and heaviness, numbness, tingling, or formication, and an awkward, straggling, tottering gait. These symptoms gradually increase in severity until perfect paraplegia, with paralysis of the bladder and rectum, set in. In many cases the disease does not prove fatal till it has involved the upper extremities and the thorax, when the muscles of respiration being slowly implicated, the function becomes disordered. If the disease extend still higher into the cervical region, the roots of the phrenic nerve become involved, and life then necessarily ceases. In many cases of paraplegia,

and especially in the more complete forms of it, the reflex function remains entire, and irritation of the sole of the foot occasions involuntary contractions of the muscles. Sometimes these reflex movements are very troublesome, the limbs being affected for many hours together with clonic spasms. In the paraplegia resulting from concussion of the spine, all reflex movements are absent.

An incomplete form of paraplegia, consisting in weakness of the legs, preceded by symptoms of constitutional disorder, with marked symptoms of dyspepsia, is not of very uncommon occurrence. The sensibility, temperature, and size of the limbs are retained, and the contractile power of the bladder and sphincter is little impaired; and there is generally little tenderness of the spine, and an absence of severe neuralgic pains at the onset of the disease. (Several cases of this form of paraplegia, with references to authors who have recognised it, will be found in a lecture by Mr. Spencer Wells, published in the *Med. Times and Gaz.*, Nov. 14, 1857.)

CAUSES.—Injuries to the spinal cord. Chronic disease of the cord or of its membranes; increasing pressure from growing curvature of the spine; caries of the vertebræ and relaxation of the spinal ligaments; pressure on the descending aorta.

Functional paraplegia is caused by various disorders of the system, such as those resulting from intense cold, excessive sexual intercourse, masturbation, and the syphilitic poison, which is a frequent cause of organic disease. Many cases of incomplete paraplegia have been referred to nervous action, and have been termed accordingly "*Reflex paraplegia*" or "*reflex paralysis*." Gonorrhœa, stricture of the urethra, nephritis, cystitis, uterine diseases and displacements, dysentery, dentition, and even irritation of the cutaneous nerves, have been advanced by various authors as causes of reflex paraplegia. The paralysis is supposed to be due, in such cases, to the arrest of the circulation in the spinal cord, from contraction of its blood-vessels, the contraction being produced by an irritation transmitted from the nerves of the diseased or irritated surface to the nerves of the blood-vessels distributed to the cord. The arguments in favour of such a theory are as follows: 1. Dr. Brown Séquard noticed contraction of the vessels of the pia mater of the cord on applying a ligature to the hilus of the kidney, or to the blood-vessels and nerves of the supra-renal capsules. 2. Violent rigors and even convulsions, affections which are generally recognised as being due to reflex irritation, occasionally attend catheterism or dilatation of the cervix uteri. 3. The absence of anatomical lesions of the cord in such cases of functional paraplegia as have been examined.

PROGNOSIS.—*Favourable*, in cases dependent on functional disorder; but *highly unfavourable* in cases accompanied by indications of disease of the spinal cord or brain. In the most favourable class of cases recovery is generally slow, occupying several weeks or months; and, in unfavourable cases, the patient may linger for several years.

TREATMENT.—The *indications* for the treatment of the foregoing forms of paralysis are the same. They consist: I. In the use of reme-

dies appropriate to the diseased condition on which the palsy depends.
 II. In the use of remedies calculated to act directly on the parts affected ;
 and III. In the relief of incidental symptoms.

1. For the first indication, see Apoplexy, Myelitis, Spinal Arachnitis, and other diseased conditions of the brain and spinal marrow.

When the disease has become chronic, and all inflammatory symptoms have disappeared, we may resort to the astringent chalybeate tonics, such as the perchloride of iron ; to the mineral acids ; to *quinine* when the system will bear it. In paralysis from cerebral apoplexy, it is apt to produce unpleasant symptoms, such as headache, and heat of head ; if these effects are produced we must intermit its use. *Strychnia*, in doses of a sixteenth or twelfth of a grain, two or three times a day, cautiously increased, may be given with advantage. Its action on the system is indicated by twitchings of the paralysed muscles, but these taken as indications of returning power are exceedingly delusive, as they seem to depend on an affection of the excitomotor nerves. The same remedy may be applied locally ; a quarter of a grain being sprinkled on a blistered surface, near the origin of the nerves affected, or near the seat of the paralysis. *Tincture of cantharides*, in doses of from twenty drops to half a drachm, has been given with advantage in some cases of paraplegia, especially in that form which depends on disease of the urinary organs. It stimulates the bladder to more healthy action, and in cases dependent on effusion into the sheath of the spinal marrow, may act favourably as a diuretic. *Oil of turpentine*, in drachm doses, suspended in mucilage, may also be given with advantage in the same cases in which cantharides is beneficial.

Paralysis resulting from constitutional disease or from reflex action must be treated according to the particular cause. (See Syphilis, Hysteria, &c.)

II. This indication is fulfilled by friction with the flesh-brush, or with stimulating liniments ; by blisters ; by the actual cautery ; by electricity. In order to apply electricity we must include the part we wish to operate upon between the two conducting wires of the battery, one wire or electrode being placed on the affected part, and the other upon the nerve centre or nerve trunk corresponding to the affected organ. The muscles are excited through the skin. Electricity may be applied in the following modes : 1. By the *electric hand*. One electrode consists of a moistened sponge, inclosed in a metallic cylinder, and this is placed upon a point of surface which is not very excitable ; the operator holds the other electrode in one of his hands, and then rapidly passes the back of the other over the parts he wishes to excite, after having dried the skin of the patient with starch, or lycopodium. 2. By including the part to be excited between two electrodes composed of sponge soaked in salt and water, and inclosed in metallic cylinders. 3. By including the part between two solid metallic electrodes, cylindrical or conical, and moving them rapidly over the affected parts. 4. By the *electric brush* ; the moist sponges being replaced by a brush of fine metallic wires. 5. By placing the two hands or two feet each into a basin of water, and plunging into each vessel one of the electrodes of the

battery. It will be obvious that the nervous centres must be stimulated in this last process. The magneto-electric battery is the most appropriate kind for generating currents for medical purposes.

In using electricity, we must bear in mind the fact that, when the current is intense, and its action prolonged in the same direction in a given part, the excitability of the nerves of the part is much enfeebled. We must carefully avoid producing this hyposthenisant action upon the nerves whose vitality we wish to increase, by using only feeble currents, guided alternately in opposite directions. But while we use only feeble currents, the velocity of the intermittencies should always be great, because by this means the contraction of the muscle is maintained, and the force of that contraction is at the same time increased. We are thus enabled to imitate artificially the voluntary motions. Slow intermittencies only produce trembling. In anæsthesia of the skin, the most intense currents are powerless in rousing sensibility if they do not succeed each other with great rapidity. In the treatment of muscular atrophy, we must also use currents with rapid intermittencies. The rapidity of the intermittencies is in direct proportion to the number of the rotations of the armature in front of the magnet.

The cases of paralysis which we may expect to be benefited by electricity, are those resulting from apoplexy of the brain or cord; but on no account must it be used until all irritation has ceased in these nervous centres—until, in fact, the clot has been absorbed and cicatrization effected. The absence of pain, and a lax condition of the paralysed muscles, will be our chief guides in determining how far these have been effected.

In addition to electricity, we may use salt-water baths, shampooing, the warm or hot-water *douche*, and, when the power of the extremities has in some degree returned, exercise. These remedies are also inapplicable in the early stage of paralysis depending on acute disease of the brain or spinal cord. They should not be applied till all symptoms of inflammation have disappeared, and the disease has become chronic.

III. When, as in cases of paraplegia and of general paralysis, the bladder and rectum are involved, the catheter should be used at least once a day; and if the urine become ammoniacal or bloody, the bladder should be washed out with warm water after the use of the catheter. Bed-sores must be carefully prevented by the use of the water-bed, and by rigid attention to personal cleanliness.

3. PARTIAL PARALYSIS.

Particular muscles or groups of muscles are subject to paralysis, through injury limited to the root or trunk of the nerves distributed to them. The muscles of expression supplied by the facial nerve are the seat of a very common form of palsy; the lesser, or non-ganglionic portion of the third division of the fifth nerve, of a less common form of partial paralysis. *Strabismus* may be caused by palsy of one or more of the muscles of the eye. The paralysis of the superior branch

of the third or motor oculi nerve occasions that falling of the upper eyelid and closure of the eye known as *ptosis*; and disease of the facial nerve entails, as one of its consequences, that open state of the eye due to paralysis of the orbicularis palpebrarum, which is known as *lagophthalmia*; paralysis of the laryngeal nerves occasions *aphonia*; and paralysis of the lingual nerve, the loss of speech.

PARALYSIS OF THE FACE.

The *motor* nerves of the face being the *portio dura*, and the lesser, or non-ganglionic, portion of the *third division of the fifth*, and the *sensitive* nerves the first and second divisions, with the ganglionic portion of the third division, of the *fifth nerve*, it is easy to trace facial paralysis to its source. In perfect paralysis of the face, the *portio dura* and motor branch of the third division of the fifth suffer jointly: when the latter alone is affected, the motions of the jaw on that side are paralysed, and in this case there is usually some loss of sensibility; but as the disease is confined to the muscles employed in mastication, there is no distortion of feature, beyond a flattening of the affected side of the lower jaw, and of the temple.

SYMPTOMS.—In palsy of the muscles supplied by the facial nerve, the expression of countenance is very peculiar. The features are drawn to the sound side, so that a straight line passing through the eyebrows and mouth respectively would meet at an angle within a short distance of the sound side of the face. In other words, the sound side appears shorter and narrower than the paralysed side. The two sides of the face wear so different an expression that the patient is said to laugh on one side and cry on the other; or the countenance has a cynical and contemptuous look. The patient is unable to frown on the affected side, and when desired to shut the eyes, the eye of the sound side is firmly closed, while that on the palsied side is either partially closed or remains wide open, the pupil, at the same time, being rotated upwards and inwards. When told to inspire through the nostrils, as in taking snuff, the nostril of the affected side collapses; when told to blow, the air escapes from the paralysed side; so also with the food, when the patient swallows, as with the saliva, when he spits: the saliva dribbles from the palsied side, and the food either slips from the mouth, or collects between the teeth and jaw, and the cheek is often bitten between the teeth. The power of whistling is also lost, and when the patient speaks, laughs, cries, sneezes, or coughs, the deformity is increased, the paralysed side remaining motionless, while the sound side is more strongly contracted than natural. The cheek on the affected side is flaccid, and swells during strong expiration. The labial consonants, *b*, *p*, and *f*, are imperfectly sounded; but the patient can speak distinctly when the lower lip on the affected side is supported by the finger. The sensation of the affected side is generally unimpaired.

The annexed woodcut (Fig. 46) shows the expression of the face in a

Fig. 46.



patient of King's College Hospital, suffering from this disease. The right side is the seat of the paralysis; and the two sides present the striking contrast just described, the right having a sad, and the left a merry, expression—a difference readily perceived by covering one side of the face and then the other.

The second woodcut (Fig. 47) is taken from a sketch of another patient of King's College Hospital. It shows the expression of the face when a patient so affected is desired to shut the eyes. In this instance the left side is the seat of the dis-

ease; and the eye of that side cannot be closed, while the eye is firmly shut on the right side. The whole face is drawn forcibly to the sound side, and all the features of that side are strongly contracted.

Fig. 47.



Fig. 48 (p. 447) exhibits paralysis of the left facial nerve in a child, described as laughing and crying on the right side, but as unable to close the left eye.

These illustrations of paralysis of the facial nerve may be advantageously compared with the woodcut (Fig. 49, page 447), which shows the state of the face in a well-marked case of hemiplegia affecting the left side. The eyelids of the paralytic side are closed, though less firmly than those of the sound side, while the features of the two sides present the same contrast, though in a less de-

gree, than in the preceding illustrations. (Figures 46 and 47 are taken from Marshall Hall's Principles of Medicine, p. 279.)

DIAGNOSIS. — Paralysis of the facial nerve alone is distinguished by the face retaining its sensibility; by the function of hearing being intact; by the unaltered state of the pupil, and the eyesight being unaffected (except as the result of the open state of the eye); by the muscles of mastication retaining their power; by the speech being only affected as above stated, and being distinct when the paralysed lip is supported by the finger; and by the absence of cerebral symptoms. Complication with deafness would show that

Fig. 48.



the other division of the seventh nerve was affected. The addition of anæsthesia would show that the fifth nerve was also implicated; and cerebral symptoms would indicate that the seat of the disease affecting the nerves was within the skull and not external to it. From hemiplegic paralysis by the absence of any disorder of innervation in the limbs.

PTOSIS, or closure of the eye from palsy of the superior branch of the third nerve, may be looked upon as a more serious disease than palsy of the facial nerve, and as more probably due to disease of the brain.

Fig. 49.



PROGNOSIS.—*Favourable.* When the paralysis does not extend beyond the parts supplied by the facial nerve. The disease is often cured in about three weeks or a month. — *Unfavourable.* Complication with paralysis of other nerves, or with symptoms of disease of the brain.

Sequelæ.—Inflammation of the conjunctiva, and in rare cases, ulceration of the cornea, and destruction of the eye of the affected side, are consequences of the loss of power in the muscles of the eyelids.

CAUSES.—Tumors within the cranium, or disease involving the root of the nerve; but intercranial disease is very rarely indicated by facial paralysis alone; deafness on the same side is, at least, a necessary concomitant of internal disease. Wounds and mechanical injuries. Disease of the petrous portion of the temporal bone in the vicinity of the tympanum. The caries resulting from scarlet fever often erodes the wall of the Fallopian canal, and the nerve being laid bare is involved in the disease and loses its function. The pressure of tumours, especially of the parotids; effusions into and around the sheath of the nerve; cold.

TREATMENT.—If intercranial disease be the cause of the palsy, and febrile symptoms be present, cupping or leeches behind the ear, followed by a blister to the same part; blue pill or calomel given so as to slightly affect the gums. (Pil. hydrarg. gr. iii. Pulv. opii gr. $\frac{1}{2}$, three or four times a day.)

Parotitis must be treated as recommended under that affection. Caries of the internal ear, by daily injections of warm water, followed by weak solution of sulphate of zinc, by tonics and attention to the general health.

LEAD PALSY—DROPPED HAND.

SYMPTOMS.—The hands are generally first affected, and in some cases the forearm also suffers. The disease begins by a feeling of weakness in the fingers, extending to the wrists, but rarely beyond them. There are at the same time shooting pains in the forearms, arms, and shoulders. The parts affected, after a time, waste from disuse, and the hands drop powerless from the wrists. The disease is generally preceded by one or more attacks of colic, but may occur independently of it.

DIAGNOSIS.—The history of the case. The seat of the palsy, assisted, in many cases, by the discovery of a blue line on the gums.

PROGNOSIS.—Favourable in first attacks, and in slight cases. In other instances, recovery after a long course of treatment. In some cases, incurable.

CAUSES.—The presence of lead in the blood and nerve tissue. This form of paralysis attacks plumbers and glaziers, oil-painters, enamel-card makers, fishmongers who use lead counters, men employed in lead-works, and persons who drink cyder conducted through leaden pipes or water kept in new leaden cisterns, the danger being, as a general rule, in proportion to the purity of the water.

TREATMENT.—Must be directed to two objects. I. To eliminate the poison from the system. II. To rouse the paralysed muscles to action. To attain the first object we may give iodide of potassium in five-grain doses three times a day with any tonic infusion. Sulphur baths in the form of vapour, or a liquid bath composed of half a pound of sulphide of potassium, in ten gallons of warm water. The second object may be attained by the use of electricity, shampooing, friction with the flesh brush, or with stimulating

liniments; and by the internal administration of strychnia, in doses of from the twentieth to the twelfth of a grain, cautiously increased, three times a day. Electricity is a very valuable remedy in this disease; the current should be a feeble one and the intermittences very rapid. It should be passed in succession through individual muscles.

PROPHYLAXIS.—Scrupulous cleanliness; the hands to be washed in soap and water, or in water containing soda or pearlash, before meals; sulphuric acid lemonade as a beverage.

4. PARALYSIS OF THE INSANE.

This form of paralysis has some peculiarities. It comes on at variable intervals after alienation. It appears first in the tongue, and occasions indistinctness in the speech and faulty or stammering pronunciation; it also affects the muscles of both sides of the face, impairing the power of expression; thence it extends to the extremities, of which the lower are commonly first affected. The commencing palsy of the legs is indicated by slight lameness and occasional tripping, and that of the arms by the frequent dropping of food and other objects from the hand. The progress of the disease is gradual, but it terminates at length in complete paralysis, with palsy of the bladder and sphincter ani, of the muscles of deglutition, and of the respiratory muscles. The patient often dies asphyxiated. The sensibility is little impaired. The common duration of this malady is four or five years. The palsy of the muscles is accompanied by loss of mental power, the patient becoming the victim of chronic dementia.

DIAGNOSIS.—In the early stage the youthful appearance caused by the relaxation of the wrinkles of the features; and, in an advanced stage, the peculiarly vacant expression of the whole countenance, and the wide open eye are very characteristic, admirable illustrations of which are attached to Sir Alexander Morison's work on Insanity. These changes of expression are well shown in the same patient in an early and advanced stage of the disease.

PROGNOSIS.—This form of disease is dependent on progressive softening of the brain, and does not admit of cure.

TREATMENT.—That of Cerebral Softening (see p. 424).

5. TREMOR MERCURIALIS—MERCURIAL TREMORS.

SYMPTOMS.—This disease usually shows itself first by weakness in the arms, which gradually increases. It is accompanied by slight convulsive twitchings, followed by tremors, increasing in violence till the patient is obliged to abandon his occupation. The trembling gradually extends to the lower extremities, and at length to the entire body. It is brought on by every attempt to move, but it ceases when the limbs

are supported, and the body is at rest. The patient dances rather than walks; he is unable to grasp objects; his speech is hurried and abrupt, and in extreme cases he cannot even masticate his food. If the patient continue to expose himself to the poison, restlessness, sleeplessness, and delirium supervene. Salivation is only occasionally present. The general health is impaired, and there are nausea and anorexia, a dry skin and a furred tongue; but there is no disorder of the circulation or respiration, and no colic. In very mild cases, especially when they occur in women, the symptoms are those of *Mimosis Inquieta* (see p. 292).

Among the minor effects of working with mercury may be mentioned a peculiar brittle state of the teeth, causing them to chip constantly, and exposing them to early decay.

DIAGNOSIS.—From *paralysis agitans*, by the history of the case, and the absence of trembling when the limbs are supported.

PROGNOSIS.—Generally favourable, if the patient can contrive to quit his employment.

CAUSES.—The process of water-gilding; employment in quicksilver mines; long exposure in any way to the fumes of mercury, or to the absorption of the oxide by the skin.

TREATMENT.—A temporary cessation of employment; a combination of tonics and sedatives (as in *Mimosis Inquieta*, p. 293); preparations of iron; a generous diet, with a moderate allowance of wine; the shower-bath.

PROPHYLAXIS.—Cleanliness and free ventilation of workshops. In those who inhale mercury, an arrangement by which the fumes can be carried off, such as a funnel terminating in a chimney; eggs swallowed two or three times a day; the free use of milk as an article of diet; in those who handle mercury, the use of gloves.

6. PARALYSIS AGITANS—SHAKING PALSY—THE TREMBLES.

SYMPTOMS.—Weakness and trembling, usually commencing in the hands and arms, but sometimes in the head, and gradually extending over the whole body. At length, the trembling becomes incessant; and when the patient attempts to walk, "he is thrown on the toes and fore part of the feet, and impelled unwillingly to adopt a running pace, being in danger of falling on his face at every step." In a still more advanced stage, the shaking continues during sleep; the patient cannot carry food to the mouth; and mastication and deglutition are performed with difficulty. The agitation at length becomes so violent as to prevent sleep; the body is bent forward, with the chin upon the sternum; articulation is impaired or entirely lost; the urine and faeces pass involuntarily, and coma and slight delirium close the scene. In some

cases, the muscles of respiration are affected, and the breathing becomes extremely frequent. (In one case occurring in a vigorous young man, 73 in the minute, with a pulse of 72.—G.)

DIAGNOSIS.—The trembling continuing even when the limbs are supported, and the peculiar gait.

PROGNOSIS.—Unfavourable in persons advanced in life. Less unfavourable when, as in rare instances, it occurs in persons in the vigour of life.

CAUSES.—*Predisposing.* An advanced period of life.—*Exciting.* Hard drinking; previous attacks of rheumatism; obscure disease of the spinal cord.

TREATMENT.—In persons advanced in life, a combination of stimulants and sedatives is indicated; in persons previously intemperate, the treatment proper to delirium tremens. In younger persons, cupping and counter-irritants to the spine, with remedies appropriate to the state of the system. If plethora be present, depletion; if great constitutional debility, preparations of steel, such as the sulphate of iron in full doses.

EPILEPSIA—EPILEPSY.

SYNONYM.—Falling sickness.

DEFINITION.—Fits recurring at irregular intervals, with sudden loss of sense and power of motion, frequently preceded by a shriek, attended by general convulsions, and usually followed by coma.

SYMPTOMS.—The patient is seized suddenly, or after a short warning, with loss of consciousness and loss of power, so that, if he be standing, he immediately falls, or is thrown to the ground. The fit, which is frequently preceded by a loud, piercing cry, consists in strong convulsive motions of the limbs and trunk of the body, and spasms of the muscles of the face and eyes, producing various distortions of the countenance. The brows are knit; the eyes fixed and staring, or turned up beneath the lids so as to nearly conceal the cornea; the pupils are dilated and do not contract when exposed to light. The hands are firmly clenched, and the arms are tossed about. The breathing becomes gasping and difficult, or is altogether suspended; the heart beats violently; the vessels of the head become turgid and the face is livid; foam, often bloody, issues from the mouth; the jaws are contracted with great force, so that the under lip, or the tongue if protruded, is apt to be severely injured. The faeces, urine, and semen are sometimes expelled, and priapism is not uncommon. After the convulsions have continued from one or two to five or ten minutes, they cease altogether, and leave the patient motionless, but in a state of insensibility, and under the appearance of a profound sleep. He gradu-

ally recovers, and, if left to himself, will generally sleep for some hours. Sometimes there is a succession of fits, with intervals of torpor, lasting for several hours.

There is a form of epilepsy, of frequent occurrence, called by the French *petit mal*, in contradistinction to the foregoing, which is designated the *grand mal*. It consists in sudden and transient giddiness, with loss of consciousness, confusion or incoherence of mind, and unsteadiness of gait, accompanied in some instances by erections of the penis, in others by slight convulsions. Such slight fits are often followed by great confusion of intellect, and sometimes by maniacal incoherence. (In one case of epilepsy belonging to this class every fit of epilepsy was followed by an unconscious exposure of the person.—G.)

Premonitory symptoms.—The fit is frequently ushered in by premonitory symptoms, such as pain in the head; lassitude; disturbance of the senses, consisting in a bright circle of colours before the eyes, or a sudden light, or minute flashes of light, or, in rare instances, spectral illusions; or there is a loud noise in the ears; or an offensive smell; or a bitter taste; unquiet sleep; unusual dread; palpitation of the heart; coldness of the joints; fluttering at the epigastrium; vomiting; a sensation of cold, or a pain arising in some part of the extremities, and gradually creeping upwards until it reaches the head (the *aura epileptica*), when the patient is instantly deprived of sense, and falls as above described. (In a case that came under my notice, every fit was preceded by the utterance of the same incoherent sentence, to which the patient attached no meaning.—G.) In the majority of cases, the fits are not preceded by any warning. They occur at very variable intervals; sometimes in the day, sometimes at night, during sleep; and there are often several fits in the twenty-four hours; in other cases, there are intervals of months or years.

CAUSES.—*Predisposing.* Epilepsy or insanity in parents or ancestors; scrofula; malformation of the head; the male sex; debility in nervous persons; dissipation, intemperance, self-abuse, and excessive or suppressed discharges.—*Exciting.* Sudden fright; fits of passion, or any vehement emotion of the mind; sexual intercourse; masturbation; plethora of the vessels of the head; anæmia of the brain and spinal cord, such as occurs in cases of excessive uterine hæmorrhage (epileptic convulsions terminate the lives of animals who are bled to death); reflex irritation from worms; dentition; acute pain; excessive evacuations; suppression of accustomed discharges, especially the urine and the bile; tumours compressing the brain, or any part of the nervous system; parasites in the brain (the *cæurus cerebri* is the common cause of convulsions in sheep). Epilepsy sometimes occurs as a symptom of irritant and narcotico-irritant poisoning, and is not infrequent in poisoning by arsenic and lead.

MORBID ANATOMY.—In the majority of cases there is no further evidence of disease than congestion of the vessels of the brain. In others, various causes of irritation have been discovered, such as thick-

ening of the membranes, spiculæ of bone, internal nodes, tumours, cystic form of tænia.

DIAGNOSIS.—From *hysteria*, from the total suspension of consciousness, the solitary cry, and the deep sleep which succeeds the fit. From *feigned* epilepsy, by the total insensibility, extending even to the retina. From *apoplexy*, by the transient nature of the fit, the absence of the stertorous breathing, and, in most cases, by the absence of paralysis, and by the completeness and universality of the convulsions.

Epileptic patients have often a peculiar expression of countenance more easily recognised than described.

From *tetanus*, by the absence of consciousness, and the clonicity of the convulsion.

PROGNOSIS.—*Favourable*. The disease being sympathetic, occurring before the age of puberty, and arising from obvious exciting causes easy of removal. In females being connected with some functional derangement of the uterine system.—*Unfavourable*. The reverse of the above. The disease coming on after the age of puberty; hereditary predisposition; scrofulous diathesis; long previous continuance of the malady, and frequent occurrence of the fits; misshapen skull; the epileptic physiognomy; impairment of the memory and judgment; fatuity, or paralysis.

TREATMENT.—I. During the fit; II. During the interval.

During the fit.—The patient must be prevented from injuring himself, and care must be taken that there is no pressure on the vessels of the neck. The patient should therefore be placed, if possible, on a soft bed, the neckcloth and shirt-collar should be loosened, and the violent convulsions should be restrained by the bystanders. To prevent the tongue from being bitten, a piece of soft wood, or a pad of linen, should be placed between the teeth. When the fits occur during sleep, and the tongue is severely bitten or torn by the teeth, the patient should wear a smooth rounded guard, fitting closely to the teeth, above and below. After the fit, the patient should be allowed to sleep; and if much exhausted, may take some slight stimulant.

In the interval.—The recurrence of the fit is sometimes prevented—

1. By removing all causes of irritation, as constipation, intestinal worms, the irritation of teething, &c.

2. By avoiding the exciting causes, such as over-distension of the vessels of the head, however induced; fits of passion, or other violent emotions of the mind; intemperance, dissipation, or other bad habits.

3. If the patient be of a plethoric habit, by occasional bleeding, abstemious diet, and saline aperients. Relief is sometimes afforded by issues or setons in the neck or arm, or by irritation in the course of the spine with antimonial ointment.

4. If the patient be weak and irritable, by tonics; as cinchona, quinine, sulphate, oxide, and valerianate of zinc, sulphate and sesquioxide of iron, sulphate or ammonio-sulphate of copper, nitrate of silver

(an objectionable remedy, because it sometimes causes permanent discoloration of the skin), and liq. arsenicalis; combined with regular hours, early rising, regular exercise, nourishing but not stimulating diet, and cold bathing, or the shower-bath.

In females attention should be paid to the state of the uterine function. If amenorrhœa with anæmia, or anæmia alone, be present, full doses of steel are indicated; if amenorrhœa with plethora, the treatment proper to plethora; if dysmenorrhœa, the treatment recommended for that disease; if leucorrhœa or menorrhagia, tonics and sedatives, with astringent injections; if the nervous symptoms attendant on the change of life, and on the debilitating diseases of the adult female, the same combination of tonics and sedatives as recommended in *Mimosis Inquieta* (p. 293).

6. If there be a syphilitic taint, mercury, or the iodide of potassium, may be given, as in other cases of secondary disease.

The most important point of the treatment is to ascertain the exciting causes, and to remove or avoid them.

REMEDIES.—*Immediately before the fit.* Pressure on the carotids; a ligature between the parts from which the *aura* first proceeds and the brain, as round the thumb or little finger when it begins there; a strong mental effort; violent exercise; violent irritation of the nostrils, with snuff, or strong smelling-salts; dashing cold water over the face and head; an emetic; a full dose of opium or laudanum.—*In the intervals.* The metallic and vegetable tonics already specified; worm-wood; the cardamine pratensis; the misletoe and oak-bark, in doses of two drachms two or three times a day; gratiola; mugwort; narcotics and sedatives, as opium, lactuca, conium, stramonium, belladonna, and digitalis; antispasmodics, as valerian, assafœtida, musk, and castor; carbonate of potass; turpentine, recommended on high authority, and indicated wherever worms are suspected to exist. *Nux vomica* and *strychnia*; electric sparks drawn from the head; the inhalation of oxygen gas. In cases preceded by the *aura*, division of the nerve running from the seat of the *aura* or amputation of the part, have been recommended, but they are of very doubtful efficacy. The same observation applies to Dr. Marshall Hall's recommendation of tracheotomy in cases of epilepsy attended with extreme difficulty of breathing.

Where no obvious cause of irritation, and no marked deviation from the usual state of health can be found, the treatment is, and must be, purely empirical. The balance of authority is in favour of tonics, of which the sulphate of zinc, in doses increased from two or three grains up to a scruple or half a drachm, three times a-day, is the best. It may be given in combination with sulphate of magnesia, in doses sufficient to insure the free evacuation of the bowels. In confirmed cases all remedies are useless.

CATALEPSIA—CATALEPSY.

DEFINITION.—A sudden loss of consciousness with fixation of the muscles in that state in which they happen to be at the moment of seizure.

SYMPTOMS.—Catalepsy is an extremely rare disease, allied to those of the present section. Its essential features are, a fixing of the body in the position in which it happens to be at the moment of the seizure, or in which it may be placed during the fit, accompanied by total insensibility. The fit itself is rarely, if ever, fatal; but the intellectual faculties seem to suffer by its frequent repetition.

A lad of about fourteen years of age, a playmate of my own, was subject from childhood to this disease. He was often seized in the midst of his sports, at irregular intervals, and without any previous warning, and fixed like a statue in the attitude in which he happened to be at the moment. The fit rarely lasted more than one or two minutes, and when it ceased, he resumed the sport in which he had been engaged with a slight air of surprise and embarrassment. He was found dead in a bath, into which he had fallen. (G.)

The *causes* of this disease are obscure, and little is known of its appropriate treatment. The general principles on which it should be conducted are the same as those of epilepsy. Existing irritation must be removed, and any occasional determination of blood to the head must be removed by appropriate remedies.

CHOREA SANCTI VITI—ST. VITUS'S DANCE.

DEFINITION.—Functional derangement of the motor nerves resulting in irregular jerking movements, more or less interfering with the voluntary actions.

SYMPTOMS.—The disease generally sets in with slight convulsive movements of the face or of one of the lower extremities, which gradually extend and increase in severity until they embrace one side of the body, or the whole frame. When fully formed, the presence of the disease is easily recognised by the following symptoms. The patient cannot remain still for a few seconds in any posture; the head is jerked to one or other side; if standing, the foot shuffles and scrapes the floor. The walk is hurried and uncertain; sometimes the affected leg is not lifted as usual, but is dragged along, as if the whole limb were paralytic; and when it is attempted to be lifted, that motion is unsteadily performed, the limb becoming irregularly and ludicrously agitated. Even when the extremity is at rest, the foot is often agitated by involuntary motions, turning it alternately outwards and inwards. The upper extremity of the same side is affected by similar convulsive movements, so that in attempting to raise anything to the mouth, the patient

often jerks it over the head, and only succeeds after repeated attempts; swallowing is performed hastily and with ludicrous grimaces. If the patient be told to hold the arm extended, the fingers cannot be kept steady, and the arm is soon withdrawn, the movement being generally accompanied or followed by a grimace. The muscles are usually quiet during sleep; but there are exceptions to this rule. The health is generally but slightly impaired; but constipation is an almost constant accompaniment, and there is sometimes loss of appetite, a foul tongue, and offensive breath. In females, the uterine functions are sometimes disordered. Incoherence is an occasional accompaniment. A bellows murmur is often heard over the heart.

The disease affects weakly boys and girls. It rarely affects adults and when it does so the choreic movements are limited. The following case which came under my care is a good illustration. A maiden lady, aged 60, had been affected for two years with convulsive movements of the muscles on the right side of the neck, twisting her face during her waking hours towards her right shoulder. While in this position it was jerked fifty times a minute still further backwards. Sometimes the head was jerked suddenly backwards. When walking she was impelled to go fast, and sometimes stumbled in consequence. There was no evidence of cerebral or spinal disease, the health was otherwise good, and she took regular exercise. When her attention was fixed upon some object the movements decreased; and on one occasion I observed her reading for a minute, during which time the convulsive movements were absent. They ceased during sleep. The affection commenced by a screwing of the right side of the face into the pillow when she lay down at night. It was removed by the internal administration of sulphate of copper and the use of the sponge bath. (J. H.)

CAUSES. *Predisposing.*—General weakness and irritability of the nervous system; youth (from 7 to 15 years of age); female sex. It may occur in adults of both sexes to the age of seventy. *Exciting.*—Intestinal irritation from constipation or worms; uterine irritation; strong mental excitement, as from fright or anger; blows or falls; irritation of the spinal cord or its membranes. In many cases rheumatism has preceded the disease, or is still associated with it, and rheumatism is therefore considered by some physicians to be a cause of chorea as well as of the cardiac disease which frequently accompanues it.

DIAGNOSIS.—From *hysteria*, by the grotesqueness of the movements, and the absence of convulsive affections of the respiratory system.

PROGNOSIS.—Favourable in the great majority of cases.

TREATMENT.—*Indications.* I. To remove causes of irritation. II. To improve the general health.

I. By far the most common cause of irritation is in the bowels, and purgatives, judiciously and perseveringly administered, are the chief remedies; in most cases, perhaps, the only efficient ones. A powder or pill consisting of equal parts of hydr. c. cretâ and pulv. rhei (the dose varying with the age) may be given every night, and a dessert or

table-spoonful of castor-oil, or other simple aperient, every morning. More active purgatives may be used if necessary. The bowels should be kept open once or twice daily, but hypercatharsis should be carefully avoided. The evacuations should be inspected daily; and the purgative plan persevered in till the discharges assume a healthy appearance. In many cases, nothing more will be required.

If the source of irritation be in the uterus, remedies appropriate to the existing disorder of that organ must be given. If there be tenderness of the spine, the case should be treated as one of spinal irritation.

II. The general health may be improved by tonics, of which the sulphate and valerianate of zinc, ammonio sulphate of copper, and the sulphate or peroxide of iron, in full doses, are the best, aided by cold affusion or the shower-bath, with nourishing diet, fresh air, and regular exercise. These remedies may be used in combination with a course of aperient medicines; but whatever else is done, purgatives should never be omitted. (One of the worst cases of chorea which I have seen, and which combined constant restlessness and grotesque actions of the muscles with mental incoherence, was cured within ten days by aperient medicines only.—G.)

HYSTERIA—HYSTERICIS.

DEFINITION.—A nervous disorder, usually attended with marked disturbance of the functions of digestion and respiration, and characterised by convulsive fits in which those functions are signally affected, and the controlling power of the will strangely impaired, without complete loss of consciousness.

SYMPTOMS.—The hysteric paroxysm, or fit, is generally preceded by an uneasy sense of fulness and weight at the pit of the stomach, with nausea, acidity, heartburn, and flatulence; followed by sighing, yawning, and stretching, dejection of spirits, shedding of tears, alternate flushings and paleness, difficulty of breathing, and palpitation of the heart. There is often a sharp pain in the left side, about the flexure of the colon, with a sense of distension, giving the idea of a ball or globe rolling itself about, giving rise to the peculiar gurgling and rumbling sound known as *Borborygma*, and gradually rising into the stomach, and hence to the throat, where it occasions the sensation of a foreign body (*globus hystericus*). The fit having arrived at its height, the patient appears threatened with suffocation; the face is flushed, the nostrils are distended, the abdomen is protruded and tympanitic, the head thrown forcibly back, and the limbs are strongly convulsed. The patient bursts into violent fits of laughter, sobbing, or screaming, utters incoherent expressions, and is in a state of temporary delirium; from which, however, she is readily roused so as to answer questions rationally. The spasms at length abate, a quantity of flatus is noisily expelled by the mouth, a large quantity of limpid urine is discharged; and the patient recovers, recollecting imperfectly what has taken place. The fit is often followed by a severe pain in the head, and a sensation of soreness over the whole body.

Sometimes the hysteric fit consists in a sudden apparent loss of speech, sense, and motion, associated with a distinct recollection of what has been said and done during the fit. Sometimes, again, it is characterised by a sudden access of laborious breathing, swollen neck, flushed cheeks, and a closed and trembling eyelid; and the patient recovers, crying and sobbing.

CAUSES.—*Predisposing.* Female sex; celibacy; the age from puberty to the fifty-fifth year; studious and sedentary life; grief; anxiety of mind; delicate health; plethora; the scrofulous diathesis. It is rare in the male sex, but liable to occur, under mingled debility and mental excitement. *Exciting.*—Constipation; dyspepsia; flatulence; excessive evacuations; suppression of the menses or lochia; the plethoric and anæmic states; violent emotions of the mind; imitation or sympathy; tight lacing, or other impediments to the breathing. Spinal irritation.

DIAGNOSIS.—From *epilepsy*, by the insensibility not being complete, and by the convulsive motions being subject to control by a strong effort of attention; by the marked affection of the respiratory muscles as shown in sighing, sobbing, and yawning, cries, shrieks, and laughter; by the features not being drawn to one side or the eye turned upwards and inwards; and by the peculiar trembling of the eyelid. (This latter sign is of great value, for whenever it is present, whether in men or women; whatever the name given to the disorder, whether hysteria, catalepsy, trauce, or mesmeric slumber, it is a sign of safety, and strongly suggestive of cold affusion.—G.) From *mimosis inquieta*, by the marked character of the hysteric fit; but true hysteric fits may be superadded to the group of symptoms which bears that name.

PROGNOSIS.—*Favourable.* In males affected with hysteria there is some ground to apprehend future mental unsoundness.

TREATMENT.—I. During the fit. II. During the intermissions.

During the fit.—In general, nothing more is necessary than to dash cold water repeatedly into the face; to address the patient in a loud authoritative tone of voice, to loosen the stays, and to apply ammonia to the nostrils. Assafoetida, æther, valerian, castor, opium, and the so-called antispasmodics, are often given, but with little effect.

The persevering use of cold water as a shock, not only serves to remove the existing attack, but often effects a cure after antispasmodics have been used in vain. In a young man who had had repeated attacks of hysteria in a marked form, and who had taken the strongest and most nauseous remedies for several weeks without effect, this simple means speedily effected a cure. I have seen a prompt and a permanent cure follow the disuse of tight lacing. (G.)

During the intermissions.—The bowels must be kept free, without being irritated with violent purgatives; and the dyspeptic symptoms must be met by remedies appropriate to the form which they assume. If there be extreme debility, stimulants will be required; if a less degree, tonics, of which the metallic are the best; if plethora be

present, a regulated diet, and in extreme cases, the abstraction of blood; if anæmia, the preparations of iron; if spinal tenderness, blisters or tartar-emetic ointment to the spine; if the symptoms of *mimosa inquieta*, a combination of tonics and sedatives. (See p. 293.) Disorders of the uterine function require the remedies proper to the particular disorder present. Change of scene, cheerful society, regular exercise, and the shower-bath may be prescribed with advantage. The diseases or states of system with which hysteric fits are most commonly combined are, plethora, anæmia, chlorosis, and *mimosa inquieta*. (See those diseases, Chap. I. p. 283 *et seq.*)

Hysteria is common in perverse and irritable females, and in persons of both sexes who possess little self-control. The education of young girls of the present day, combining, as it does, an excessive mental, with a defective physical exercise, is such as completely predisposes them to hysteria.

Hysteria is rare in strong-minded females: and of three cases which have come under my notice in the other sex, two occurred in men remarkable for their want of self-control, one of whom became insane; and the third was a single attack occurring in a medical student, on obtaining a prize for which he had long been anxiously striving. (G.)

In the foregoing description, the term hysteria has been restricted to a disorder accompanied by fits, but it is usual to give to this term a much more extended meaning, and to designate as hysterical all the more obscure diseases of females. This indiscriminate usage of the term often leads to unsatisfactory views of the real condition with which we have to do. Thus, extreme tenderness of the skin of the abdomen, or neuralgic pain of the muscles, often confounded by careless observers with peritonitis, is designated as hysterical, as also with pleurodyne, which is apt to be mistaken for pleuritis. There are other affections, however, which may still, without impropriety, be designated as hysterical; such as aphonia, dysphagia, dry noisy cough, dyspnœa, hiccup, flatulence, paralysis, syncope, brow ague, irritable breast, besides a large class of anomalous nervous affections, which often closely simulate diseases of a more formidable character. The mind of hysterical females is, doubtless, often in a state bordering on insanity; an intense desire for sympathy being the mainspring which sets the strange machinery in motion. The mind, in fact, is in the same state as the body; and as the convulsive movements are partly due to an excited state of the reflex function, and partly to an absence of self-control, so the extraordinary mental condition is the effect of the extension of the same condition of the nerves to the brain, accompanied by the same absence of self-control.

We shall often be greatly assisted in determining the true nature of these anomalous diseases by observing one or other of the following circumstances:—1. That the patient, seeming to labour under a disease which is usually accompanied by emaciation and a decided appearance of ill-health, loses neither flesh nor colour; so that if she has long been confined to bed with paralysis, her limbs remain plump and firm; if she has not been able to swallow for weeks, or is troubled with

incessant vomiting, she seems to have taken at least three meals a day; if she has been a martyr to excruciating pain, her face is as free from wrinkles as if she had never had a care or a pang. 2. That though, in some anomalous cases, the patient seems to be altogether insensible, the pulse beats as usual, the face has its natural colour, and while all other parts are motionless, the eyelids vibrate rapidly, and especially when any effort is made to rouse her. 3. That a great proportion of these affections are associated more or less with disorders of the respiratory function. 4. That the patient is, or has been, subject to flatulence, borborygma, globus hystericus, or well-marked hysterical fits. In the treatment of these disorders, the medical man must combine great firmness with kindness, and not spare cold water. Cold affusion is the only remedy which can be relied on, and is worth a whole pharmacopœia of antispasmodics. (G.)

TETANUS—LOCKED JAW.

SYNONYMS.—Trismus. Rigid spasm.

VARIETIES.—1. Traumatic Tetanus. 2. Idiopathic Tetanus; including Tetanus neonatorum.

SYMPTOMS.—In most cases the first symptoms of the disease are obscure. In traumatic tetanus, they are generally preceded by pain at the seat of the injury. In both forms, the first symptom is usually a sense of stiffness in the nape of the neck, rendering the motion of the head difficult and painful. This is soon followed by a sense of tightness and stiffness in the lower jaw, and by difficulty in swallowing. The patient also complains of pain, often violent, referred to the sternum, and thence shooting to the back. This is followed, after a greater or less interval, by increased rigidity of the lower jaw, and by spasms of the muscles of the neck, pulling the head strongly backwards. The teeth at length become so closely set together, as not to admit of the smallest opening, when the affection is called *trismus*, or *locked-jaw*; and the features gradually stiffen into a ghastly fixed smile.

As the disease advances, the muscles of the trunk and spine become involved, so that the whole body is bent forcibly backwards (*opisthotonos*), or forwards (*emprosthotonos*), or to the side (*pleurosthotonos*).

At length, every organ of voluntary motion partakes of the disease; the extremities are rigidly extended; the abdominal muscles strongly contracted; the eyes fixed; the forehead furrowed; the jaws strongly closed, and the angles of the mouth powerfully retracted and wrinkled, giving to the face the expression of a sardonic grin. These violent contractions occasion the most excruciating pain. The pulse is accelerated, the respiration suspended or laborious, the heat of the surface greatly increased, and the skin covered with a profuse perspiration. A partial remission of the symptoms occasionally takes place every ten or fifteen minutes, but they are renewed, with aggravated torture, from the slightest causes, even the least motion of the patient, or the touch of an attendant. If the patient fall asleep, the muscles relax.

In fatal cases, the symptoms rapidly increase in severity; there is urgent dyspnœa, with an agonising sense of suffocation; a cold clammy sweat; a small and impereptible pulse; froth or bloody muens at the month; the countenance becomes livid; delirium sometimes supervenes, and the patient dies exhausted, or suffocated by the rigid spasm of the muscles of respiration. The mind, in most cases, remains intact to the last.

The *duration* of the disease varies. One case of acute tetanus is on record which proved fatal in a quarter of an hour; the common duration of fatal cases is from four to eight days. In cases of recovery, the duration varies from a week to two or three months.

LATENT PERIOD.—From a few minutes to ten weeks. Most common period, from the fourth to the fourteenth day.

CAUSES.—*Predisposing.* The male sex; robust and vigorous constitution; warm climates; the period of infancy.—*Exciting.* Vicissitudes of temperature; exposure to cold and damp, or to excessive heat; great fatigue; wounds, especially punctured wounds of the extremities; injuries of nerves or tendons by puncture or laceration; the presence of irritating substances in the stomach or alimentary canal (the common cause of the *tetanus neonatorum*); cessation of habitual discharges; irritation of the extremities of the nerves; affections of the mind; strychnia, and the plants of which it is the active principle; some of the more active irritant narcotico-acrid, and narcotic poisons.

MORBID ANATOMY.—Not constant. In some cases there are signs of inflammation in the spinal cord and its membranes (*centric* tetanus); but in many instances those parts are perfectly healthy, the disease being due to some remote irritation conveyed to the spinal marrow, and reflected on the muscles (*eccentric* tetanus). Trauma of injury to the nerves in cases of traumatic tetanus. The muscles often ruptured and gorged with blood.

DIAGNOSIS.—From the *effects of strychnia* by the obscure character of the first symptoms, their slow development, and local character, (the stiffness of the jaws and difficulty of swallowing preceding, often by a considerable interval, the affection of the muscles of the trunk and extremities); also by the interval of several hours or days which elapses in tetanus before the patient dies or recovers. To this rule there are a few exceptions in cases of injury to the spine; whereas poisoning by strychnine proves fatal in from a quarter of an hour or less to within three hours. From *tetanic* spasms following the action of other poisons by the coincidence in such cases of other symptoms characteristic of the action of those poisons. (For other means of diagnosis see Dr. Guy's Principles of Forensic Medicine, p. 500.)

PROGNOSIS.—Extremely unfavourable; more so when the disease arises from wounds or injury to the nerves than when proceeding from cold; when it comes on suddenly, and soon after the receipt of an injury, and rapidly increases in severity, than when slow in its progress; when the spasmodic contractions quickly succeed each other, and are excited by very slight causes, than when there is a considerable interval. Survival beyond the fourth day is a favourable circumstance.

TREATMENT.—Four modes of treatment have been adopted;—the purgative, the sedative, the antidotal, and the counter-irritant. The best *purgatives* are turpentine and croton oil. An ounce of the former or from one to three drops of the latter may be given; a powerful clyster consisting of f. ℥j. each of castor-oil and turpentine, may be simultaneously administered. The *sedative* plan of treatment includes the use of the cold douche, applied to the whole of the body; of bladders of ice placed along the spine; and the internal administration of opium, tobacco, conium, henbane, or Indian hemp. Such doses of these drugs must be given as will fairly bring the patient under their influence. They should be given in a fluid form.

Cold affusion is a remedy which must be used with great caution. The best mode of applying cold is to place the patient in a warm bath, or to wrap him in hot blankets, and then to pour cold water on the head, at first from a moderate height, and in a stream, and if the patient bears this well, from a greater height and in a fuller stream. The sudden shock has more than once proved fatal. The hand should be kept on the pulse during the operation, and its effect on the circulation should be carefully noted.

The *antidotal* plan promises to be the most successful. It consists in the exhibition of medicines which diminish the function of the spinal cord. Alcohol and aconite have this effect. The former may be given until intoxicating effects are produced; the latter, in ten or fifteen minim doses until numbing and prickling sensations are experienced.

The *counter-irritant* plan consists in the application of blisters along the whole length of the spine, and in the use of electricity. When a continuous current of electricity is passed along a nerve its excitability is diminished; and M. Remack thought that he could prove in man that these currents possessed the property of causing involuntary contractions to cease by preserving to the muscles the faculty of obeying the will. Nobili and Matteucci have succeeded in relaxing muscles affected with tetanic spasm by passing a current through them, the direction of which was the reverse of that which naturally circulates in the nerves. We may therefore hope to control the excessive electrical excitement of the spinal cord by passing through it a continuous current, from a voltaic pile or trough, taking care that the conductor in connection with the zinc plates be placed at the top of the spine and the other lower down, or upon the surface of the limbs in succession. In order to bring the cord within the more immediate influence of the current, a stout needle or two in connection with the conductor may be passed through the integument and muscles covering the spine. If the mouth continues firmly closed, food and medicines must be given by means of a flexible tube passed through the nostrils, or behind the last molar tooth, or by enemata. During the fits, the patient may be brought under the influence of chloroform.

If there be any tenderness of the spine, a blister or a bladder of ice may be applied to the whole length of it.

The rest of the treatment will consist in giving wine and nourishment at short intervals, and keeping the patient as quiet as possible.

TETANUS NEONATORUM—INFANTILE TETANUS.

SYNONYM.—*Trismus nascentium*.

SYMPTOMS.—In the second or third week after birth, tetanic spasm, beginning in the muscles of the jaw, and thence, in some cases, extending to the whole body, and proving rapidly fatal.

CAUSES.—Improper diet, as in the Westmann Islands, off the coast of Greenland, where the food of children consists almost exclusively of fish; intestinal irritation in hot climates; the impure air of crowded foundling and lying-in hospitals. Intense cold.

TREATMENT.—An aperient should be promptly administered, and the child should be placed in a warm bath. The diet should be restricted either to the mother's milk, or to the milk of the cow. A drachm of castor-oil is a convenient aperient. Free ventilation is an essential part of the treatment.

HYDROPHOBIA—CANINE MADNESS.

DEFINITION.—Intense excitability of the nervous system, with local inflammation of the fauces acting upon the spinal marrow through the incident nerves, and giving rise to reflex spasm of the muscles of deglutition.

SYMPTOMS.—At an uncertain interval after receiving a bite from a rabid animal, pain, stiffness, or some unusual sensation, often accompanied by inflammation, is felt in the seat of the wound, followed, in many cases, by pains darting from it along the course of the nerves. These local symptoms are not always present. After a few hours or days, wandering pains are felt in different parts of the body, the patient complains of stiffness of the neck and throat, and is restless, irritable, and drowsy; his spirits are depressed, he is observed to sigh frequently and deeply, and his sleep is disturbed with frightful dreams.

The true nature of the case is first revealed by an unusual difficulty in swallowing liquids, which becomes more and more strongly marked till it rises to such a pitch, that the moment any fluid is brought near the patient, or when the noise of the fluid is heard pouring out of any vessel, it causes him to start with horror, and the attempt at deglutition is hurried, accompanied with sobbing or deep-catching sighs, and followed by convulsions.

There is a degree of irritability beyond description; the countenance expresses intense anxiety, alarm, and suspicion; the eyebrows are contracted, the eyes wild, staring, and glassy; there is intolerance of light and sound, urgent thirst, a parched tongue, a hot and dry skin, and painful efforts to vomit. The sufferer often screams violently, talks in a loud, important, and authoritative tone, and spits out the viscid

saliva between his closed teeth, with loud and noisy strainings, not unlike the barking of a dog. In spite of these severe sufferings, the mind often remains unaffected to the last, but in other cases the patient lapses into wild delirium, talks incessantly and incoherently, and is in a state of the most distressing restlessness; the slightest motion, or sudden change of position, a breath of air, a ray of light, a polished surface, or the slightest noise, will excite a sensation of suffocation or convulsions; delirium in some instances takes place, convulsions now become frequent, and the patient dies convulsed, exhausted, or asphyxiated.

DURATION.—Generally from two to three days. In one case, thirty-six hours; in rare instances, eight or nine days.

LATENT PERIOD.—From three or four weeks to some months, or even years: most common period from twenty to forty days.

DIAGNOSIS.—The disease cannot be confounded with any other. The cause and symptoms are alike peculiar and characteristic.

PROGNOSIS.—Fatal. The disease has hitherto defied all remedies.

MORBID ANATOMY.—Not constant. Slight traces of inflammation in the spinal marrow and its membranes. Inflammation of the fauces and air-passages, with increased secretion.

TREATMENT.—*Indications.* I. To prevent the absorption of the poison. II. To remove the irritation of the throat. III. To diminish the excitability of the nervous system.

I. The first indication is fulfilled by the prompt excision of the wound, which should be allowed to bleed freely. If this cannot be done at once, and the wound is on the arm or leg, a ligature should be applied above the wound, and the virus should be withdrawn by suction. After the removal of the part, and the cessation of the bleeding, suction should be resorted to, and after this a warm poultice or warm-water dressing should be applied. This treatment is to be preferred to the use of caustic.

II. The second indication has never been effectually fulfilled in any other way than by causing ice to be swallowed in large quantity.

III. The third indication may be fulfilled by powerful doses of narcotic remedies. Experience, however, proves that even the largest doses have little or no effect in controlling the patient's sufferings. Chloroform is to be preferred, as most easy of application.

Ice was swallowed with great advantage in a remarkable case admitted to King's College Hospital under the late Dr. Todd. The patient, a boy seven years of age, labouring under hydrophobia in its most marked form, and refusing, with characteristic horror and impatience, everything previously offered him, whether in a liquid or solid form—and who had taken ten drops of dilute hydrocyanic acid, repeated at short intervals, and at length twenty drops in one dose, without apparent effect—after the most severe convulsive paroxysms which had yet seized him, was offered a fragment of rough ice. This he

swallowed with avidity. Fresh pieces were constantly put into his mouth, which he seized and erunched between his teeth with remarkable eagerness, and swallowed with the greatest ease. In less than half an hour, he had taken, by a rude estimate, no less than a pound and a half of rough ice. At the same time that the ice was given internally, a bladder containing a mixture of roughly-powdered ice and common salt was applied to the whole length of the spine and around the throat. Under the external and internal application of cold, all the symptoms of hydrophobia, referable to the throat and chest, with the exception of occasional hawkings, had passed away; the viscid mucus no longer flowed from the mouth, the mucous râle disappeared from the chest, and nothing remained but extreme restlessness, violent excitement, and incoherence. The patient sat up in bed with a large fragment of rough ice in each hand, talking incessantly in a loud voice, addressing a thousand incoherent questions to his mother regarding members of his family, and showing an aimless eagerness. The intense excitement continuing, and all the peculiar symptoms of hydrophobia having subsided, the cold *douche* was, in Dr. Todd's absence, applied by my directions, but the system did not rally from the shock. (See *Lancet*, January 22, 1842, for a longer report of the case.)

I am inclined to attribute more benefit to the internal than to the external use of ice in this case, but the joint administration, while the rest of the body is kept warm, seems to be the most rational treatment yet recommended. (G.)

DISORDERS OF THE MIND.

MANIA	Furious Madness.
MELANCHOLIA	Melancholy Madness.
HYPOCHONDRIASIS	Vapours—Low Spirits.
DELIRIUM TREMENS	Drunkard's Delirium.

MANIA—FURIOUS MADNESS.

SYMPTOMS.—This disease sometimes come on suddenly, but more frequently slowly and almost imperceptibly, being preceded by a period of *incubation*, of variable length, extending from some days or weeks to as many months or years. The symptoms of this period of incubation are an alteration in the thoughts, habits, tastes, temper, and affections, the patient becoming more and more the reverse of his former self. He suffers from a distressing confusion of ideas, a failure of memory, depression of spirits, a loss of interest in his ordinary pursuits, with extreme irritability of temper, restlessness, and wakefulness; and he has a miserable consciousness of loss of mental power and change of character. The general health suffers; there is pain in the head, and giddiness; the appetite fails, the sleep is disturbed, the bowels are confined, or irregular, or affected with diarrhœa; the tongue is furred; the pulse frequent and quick; the patient grows thin, and the

features alter. Frequently before the disease shows itself in its marked form, the bodily health improves, and the painful consciousness of unsoundness of mind disappears.

After these symptoms of the period of incubation have lasted for a longer or shorter period, without forcibly attracting attention, some accident, some injury to the head, some mental shock, or unusual excitement of the mind, or some circumstance in itself unimportant, brings on a decided attack of mania.

The symptoms of mania, whether they set in suddenly or come on gradually, are the following:—anxiety, uneasiness, restlessness, sleeplessness, alternate excitement and depression, or continued agitation and violent muscular efforts, rapid incoherent discourse, fits of loud laughter or loud shoutings, grinding of the teeth, spectral illusions, mental delusions, and unfounded antipathy to certain persons, particularly to near relations or intimate friends. There is a peculiar wildness and fierceness of the countenance, the pupil is dilated, the eyelids widely open, the eyes glistening and unsteady, the features strongly marked, and the countenance flushed. The patient will sometimes complain of severe pains in the head, giddiness, loud noises in the ears, and bright spots before the eyes. The sensations are generally more obtuse than usual, or they are disregarded, so that the patient will bear the most intense cold or heat, prolonged abstinence from food or drink, and long-continued want of sleep. The bowels are usually costive, and require strong aperients; the taste is often depraved, and the appetite variable; the tongue is dry and furred; the pulse increased in frequency, quick, and often full; and the skin often emits a peculiar, offensive odour: the habits are careless and negligent, and often filthy. The disease is sometimes complicated with epileptic fits, with symptoms of paralysis, or with disease of the brain.

Some manias have lucid intervals, which occur with regularity; others are subject to paroxysms of very irregular occurrence. They are also capable, under certain circumstances, of considerable self-restraint, and of concealing their delusions or designs, and they will carry out their plans with the cunning of rogues, and the contrivance of sane men.

Attacks of mania sometimes seem to suspend other diseases, such as gout and consumption: they may also be attended by a remarkable improvement in the general health; and they are consistent with the attainment of a good old age. Relapses are common in this disease. Mania often supervenes on less acute disorders of the mind, and it generally passes into dementia, which is often complicated with paralysis.

MORBID ANATOMY.—Atrophy of the brain; thickening and loss of transparency in the arachnoid; serum beneath the arachnoid, in the ventricles, or at the base of the brain; increased or diminished vascularity of the substance of the cerebrum, softened or the grey matter, especially in cases accompanied by paralysis; increased density of the whole brain, or of parts of it. But there is no morbid appearance proper to insanity.

CAUSES.—*Predisposing*. Hereditary predisposition; the adult age (I have never seen it earlier than the sixteenth year—Heberden). *Exciting*.—Violent emotions of the mind; intense application to study or business; immoderate indulgence of the passions; violent exercise; frequent intoxication; suppression of evacuations; worms; long-continued discharges; parturition, lactation, and change of life; blows on the head. Certain diseases of the brain, preceding attacks of epilepsy, and acute febrile disorders.

DIAGNOSIS.—From *encephalitis*, by the absence of febrile symptoms. From *delirium tremens*, by the more violent excitement, the more complete incoherence, the absence of tremor, and the history of the case.

PROGNOSIS.—*Favourable*. The mania following some other disease, or arising from some temporary cause, such as an occasional excitement of the mind or a single debauch; the attacks being slight, and not frequent in their recurrence; youth; hæmorrhage; diarrhœa; scabby eruptions; restored hæmorrhoidal or menstrual discharge. *Unfavourable*.—Coming on after the middle period of life, or having been of long continuance; complication with epileptic fits, or with symptoms of paralysis.

TREATMENT.—During the period of *incubation*, the *medical* treatment must be determined entirely by the condition of the bodily functions. If there be symptoms of determination of blood to the head, they must be met by remedies suitable to that state; if the bowels be habitually confined, aperients must be regularly administered; when the secretions are disordered, the patient must be put under a course of alteratives; suppressed discharges must if possible be restored; if there be anæmia, or debility arising from other causes, tonic remedies are indicated, and if the habits of the patient be in any respect unfavourable to health, a change must be insisted upon. The habitual use of the shower-bath, change of air, a nutritious and unstimulating diet, and regular hours for meals and rest, should be particularly enforced; an entire or partial abstinence from business, change of scene, and cheerful society. The *moral* treatment will consist in removing as much as possible all causes of excitement, all unnecessary opposition to the patient's plans and wishes, and great forbearance must be used on the part of relations and attendants.

Treatment of the disease when fully developed.—If the patient be plethoric, or there be decided symptoms of determination of blood to the head, bleeding, cupping, leeching, cold to the head, brisk purgatives, and low diet must be prescribed. When the patient is extremely violent and sleepless, opium may be given with advantage in very large doses, as lately recommended by Dr. Oliver. We may begin with five grains, and increase the dose till it reaches ten, fifteen, or even twenty grains; and as much as half a drachm may be given in the course of the day, and continued for days, or even weeks. This treatment seems to be peculiarly applicable to cases brought on by exhaustion, whether from loss of blood, starvation, intemperance, or dissipation. It would also

be indicated in puerperal mania. (See Medical Times and Gazette, August, 1853.) If the face be pale, or the attack of mania have been preceded by loss of blood, debilitating discharges, or exhausting diseases, tonics or stimulants, according to the degree of the debility, in combination with opiates, must be resorted to. In all cases allied to hysteria, the shock of the cold affusion, or the shower-bath, is highly advantageous.

The moral treatment.—In recent cases of mania, occurring in private houses or in hospitals, it is necessary to prevent the patient from offering violence to himself or others by the strait waistcoat, or the coercion of powerful attendants. The fury of madmen and the viciousness of brutes can be tamed by similar means. While treating him kindly, the attendant must make the patient feel that he is both the wiser and stronger. In chronic cases, and in lunatic asylums, personal restraint can often be foregone, and constant watchfulness, gentle and conciliating treatment, and occasional seclusion, may be substituted. Much depends upon gaining the confidence of the maniac, and keeping out of sight all irritating means of restraint.

The patient should be engaged in some exercise or pursuit that will employ at once the body and the mind, and thus divert the latter from pursuing one invariable train of thought. He should, therefore, be removed from those objects with which he was formerly acquainted, and out of reach of things and persons associated with the origin of his disease. In cases where there is a tendency to suicide, the most constant watchfulness is required.

Mania is only one of many disorders of the mind, but it is the one which the general practitioner is most likely to be called upon to treat. The other forms of mental unsoundness, not treated of in the present chapter (viz., idiocy, imbecility, and dementia), rarely require more than moral treatment.

For a more minute account of many of the phenomena of unsound mind, see Part I. p. 127.

MELANCHOLIA.—MELANCHOLY MADNESS.

SYMPTOMS.—This disease is characterised by dejection of spirits, fondness for solitude, timidity, fickleness of temper, and great watchfulness, and is generally accompanied by disorders of the digestive organs, with flatulence and costiveness. The mind pursues one object or train of thought, which in general bears a near relation to the patient himself, or to his affairs, which he views with great and unfounded apprehension, and extreme depression of spirits. This painful state of mind is often attended by a strong propensity to suicide. In one form of the disease the patient refers some bodily sensation to imaginary and impossible causes, as living animals, or even persons, in the stomach or bowels.

CAUSES.—*Predisposing.* Au hereditary tendency to insanity; the

melancholic temperament. *Exciting*.—Long-continued disease of the liver and organs of digestion; suppressed evacuations or cutaneous eruptions; distress of mind; sudden mental shocks; anxiety; excessive evacuations; intemperance.

DIAGNOSIS.—From mere depression of spirits by its exaggerated and persistent character, and the existence of delusions. The term melancholia is sometimes improperly used for monomania.

PROGNOSIS.—*Favourable*. The absence of hereditary predisposition; the previous short duration of the disease; the reappearance of habitual evacuations, or diseases of the skin; sound sleep. *Unfavourable*.—Hereditary predisposition; the melancholic temperament exquisitely formed; the chronic character of the disease, or its association with epilepsy or palsy.

TREATMENT.—The *medical* treatment consists in regulating the functions of the stomach and bowels by aperients and alteratives, and in the use of remedies adapted to the existing state of the patient's constitution. The shower-bath may generally be prescribed with advantage.

The *moral* treatment consists in changing the scene, amusing the mind, and diverting the attention as much as possible from the existing train of thought; travelling, rural sports, society, conversation on favourite topics, and music, may be recommended, according to the tastes of the patient, his previous habits of life, and the experience of his friends or attendants. Patients who betray the slightest tendency to suicide must be closely and constantly watched. When the patient supposes the stomach or bowels to be the seat of some living animal, a pretended operation for its extraction will often effect a cure.

HYPOCHONDRIASIS—VAPOURS—LOW SPIRITS.

SYMPTOMS.—Dyspepsia, with dull pain in the hypochondria; languor, listlessness, want of resolution and activity, disposition to seriousness, sadness, and timidity as to future events. The patient pays particular attention to his health, exaggerates his symptoms, and takes very depending views of his case.

CAUSES.—*Predisposing*. The melancholic temperament. *Exciting*.—Dyspepsia; painful impressions upon the mind; distressing events.

DIAGNOSIS.—From *melancholia*, by the more constant dyspeptic symptoms, and the absence of well-marked delusions. From *dyspepsia*, by the exaggerated importance attached to existing symptoms.

TREATMENT.—That proper to dyspepsia. Change of air and scene, where they can conveniently be had, should be prescribed; and the patient should be diverted, as much as possible, from the thought of his complaints. Care should be taken not to increase the disease by prescribing active remedies.

Drinking a good deal of fluid may be useful both by raising the nervous in general & also in brain & by increasing secretion in carrying waste products especially of nervous system. H. B.

DELIRIUM TREMENS—DRUNKARD'S DELIRIUM.

SYNONYM.—Mania à potu.

This disease, though named after its most common cause (drunkenness), must be understood to be also producible by any cause of cerebral exhaustion or shock.

SYMPTOMS.—Sleeplessness; restlessness; excitability; strange illusions of the senses of sight and hearing; and delirium, during which the patient recognises those about him, answers questions rationally, and does hurriedly what he is told to do. He talks incessantly, and evinces a great anxiety to be doing something; and will often be found busily looking, in unlikely places, after some object on which his mind is intent; or he will transact his ordinary business in a dreamy and strange way. He is very suspicious, and fancies that he is surrounded with enemies, or that he is in a strange place, from which he is constantly endeavouring to escape; or he thinks that some great evil is impending, or has actually befallen him. His attention is constantly diverted by illusions of various kinds. He is rarely violent, at least in the best-marked cases of the disease; but he sometimes exposes himself to danger in endeavouring to effect his escape. Trembling of the lips, hands, and muscles is generally present, and more particularly in speaking, or on making any effort. There is profuse perspiration, a moist and slightly-furred tongue, and a small, quick, frequent, and compressible pulse. The countenance, in the majority of cases, is pale, and the manner of the patient composed and rational, even when describing symptoms and imaginary events calculated to excite and interest persons in their right mind. In other cases decided symptoms of phrenitis indicated by a hot head and flushed face, accompany the delirium. In fatal cases, the delirium lapses into the typhoid state, the tremor passes into subsultus tendinum, and the evacuations become involuntary; or embarrassed respiration, and mucous râle usher in death by apnoea. To drunkards, in whom the cause persists, the disease is very apt to recur.

The spectral and other illusions of the senses in the subjects of delirium tremens are in some respects peculiar. They generally have reference to animals. The patient will be seen listening to the arm of a chair, believing it a serpent, or he will scratch it with his nail, alleging that it is the hiding-place of a scorpion, and he will accuse a bystander of threatening to kill him. Sometimes he confounds inanimate with living objects on account of some single resemblance: thus a groom suffering from delirium tremens will lift up the leg of a table as if it were a horse, and harness chairs with string under the same curious conviction.

MORBID ANATOMY.—In traumatic delirium no morbid appearances. In death after repeated attacks of mania à potu, hardening of the brain, and a little more fluid than usual in the ventricles and subarachnoid spaces. Alcohol has been detected in the serum of the ventricles. In cases accompanied by symptoms of cerebral inflammation more or less fulness of the vessels and effusion of fluid.

CAUSES.—*Predisposing.* Habitual indulgence in spirituous liquors, in opium, or in other poisons belonging to the class of narcotics and sedatives. Mental exhaustion from intense study or prolonged anxiety. The summer season. *Exciting.*—An occasional debauch; continued intemperance; sudden abstinence from an accustomed stimulant; loss of blood; all causes of debility; shock, physical or mental; severe wounds (delirium traumaticum). Diseases occasioning, or ending in, great exhaustion.

DIAGNOSIS.—From simple *meningitis* by the previous history; by the absence of headache; a moist skin; trembling of the hands; the appearance of illusions; the timid, suspicious, and excited manner, and generally by the absence of febrile and inflammatory symptoms. The distinction between meningitis and a form of delirium tremens coming on after a single debauch, or a comparatively short indulgence in habits of intoxication, is not so easily made, and, in extreme cases, the history of the patient and of the existing attack will be our only guide to treatment. When the respective diseases are well marked, there is no difficulty in the diagnosis.

PROGNOSIS.—*Favourable.* In proportion to the physical strength of the patient. *Unfavourable.*—If the pulse be small, weak, and intermittent, and opium induces little or no tendency to sleep.

TREATMENT.—*Indication.* I. To procure sleep. II. To sustain the strength. III. To reduce inflammation when present.

I. This indication is fulfilled by full doses of opium, laudanum, morphia, or other preparations of opium. Two or three grains of solid opium, or from half a drachm to a drachm of laudanum, followed, at intervals of one, two, or three hours, by a grain of opium, or from twenty drops to half a drachm of laudanum, till sleep is procured, is the appropriate treatment; other preparations of opium, in equivalent doses, may be substituted. The opium may be combined with ammonia (℞. Ammonia carb. gr. v.; Tinct. opii ℥xxx.; Aquæ camphoræ f. ʒiss.), with wine, or with the accustomed stimulus of the patient.

II. If the pulse be very feeble, ammonia and bark, beef-tea, brandy and eggs, must be freely administered. Large doses of digitalis have lately been recommended in delirium tremens. The physiological action of this plant in depressing the heart's action we believe has been sufficiently proved, and since depression is the condition in delirium tremens that we have to counteract, we consider digitalis, which may be given with advantage in encephalitis, to be directly forbidden in the treatment of delirium tremens.

III. Inflammatory symptoms are best treated by cold to the head and blisters to the neck. Blood-letting is contraindicated in all cases. The bowels should be kept moderately open, but strong purgatives should be avoided.

The patient should be watched, and the windows well secured by bars or shutters. One or two strong persons should be at hand for security's sake, and if there be any inclination to violence the strait waistcoat must be used.

CHAPTER II.

DISEASES OF THE CIRCULATING SYSTEM.

1. Of the Heart.
2. Of the Arteries.
3. Of the Veins.

DISEASES OF THE HEART.

1. Functional or Nervous Affections.
2. Structural or Organic Diseases.

1. FUNCTIONAL OR NERVOUS AFFECTIONS.

PALPITATIO	Palpitation.
SYNCOPE	Fainting.
ANGINA PECTORIS	Spasm of the Heart.

PALPITATIO—PALPITATION.

PALPITATION is one of the symptoms of organic disease of the heart; but it may be only a functional derangement; so that the term *palpitation*, or *nervous palpitation*, is used to denote frequent, strong, and tumultuous movements of the heart, without appreciable organic lesion. When existing in an extreme degree, the beats of the heart are both heard and felt by the patient, especially when lying on the left side; and they may even be seen by the bystander. They are sometimes accompanied by a slight and transient *bruit de soufflet*, which disappears when the heart becomes quiet. The palpitation is attended by a painful sensation of sinking, referred to the region of the heart or pit of the stomach, and spoken of as “a sinking at the heart.” In some cases there is a tendency to syncope. Fits of palpitation often occur on first waking in the morning.

CAUSES.—*Predisposing*. The nervous temperament; the female sex. *Exciting*.—Strong mental emotions—joy, grief, anger, sadness, fear, anxiety. Violent exercise. Debility caused by chronic maladies, or occurring during convalescence from fevers or other acute diseases; excessive loss of blood; inordinate natural discharges; abuse of purga-

tives; dyspepsia, accompanied by flatulence; want of nourishment; intemperance; the excessive use of tobacco; want of sleep; continued anxiety and distress; close confinement; intense study; dissipation and debauchery; excessive sexual intercourse; onanism (hence the frequency of palpitation among prisoners). In females, change of life.

Palpitation frequently accompanies valvular disease of the heart, and it is a prominent symptom in the following diseases: anæmia, hysteria, spinal irritation, *mimosis inquieta*, and leucorrhœa, in females; spermatorrhœa, in males; and plethora, dyspepsia, bronchitis, emphysema, and pulmonary consumption in both sexes.

Long before any other symptom of pulmonary consumption has made its appearance, the patient will often complain of distressing palpitation; and this is so common, that palpitation, not otherwise readily accounted for, should lead to an examination of the lungs.

Chlorotic girls are often supposed to labour under organic disease of the heart, when there is only functional or nervous disturbance of the organ. They complain of palpitations, difficulty of breathing, and pain in the left side, and are sometimes leeches, cupped, and blistered when they require an opposite treatment. In females who suffer from spinal irritation, the heart is often very irritable, and the pulse may exceed 160 in the minute.

DIAGNOSIS.—The condition of the general health; the absence of the physical signs of organic disease; the peculiarly distinct character of the sounds of the heart; the absence of inequality and irregularity of the pulse (except in rare cases of dyspepsia); the entire freedom enjoyed at intervals; the great frequency of the pulse when the finger is first placed upon it, and the gradual diminution which follows as the patient's apprehension disappears.

TREATMENT.—Idiopathic palpitation in plethoric individuals may require the abstraction of blood from the arm, or by leeching or cupping to the region of the heart, followed by saline aperients, low diet, and rest. In most cases we must direct our treatment chiefly to the cause of which palpitation is but a symptom. In delicate, nervous, and chlorotic persons, tonics, chalybeates, cold or shower baths, change of air, a nourishing diet, improvement of the digestion and general health, with moderate exercise. But in obstructive pulmonary diseases, and in valvular diseases of the heart itself, the palpitation which was at first but a symptom of these diseases, may subsequently become a cause of their aggravation, and our first endeavour must be to subdue the excitement of the heart. When its action is very tumultuous and irregular, much benefit may be expected from digitalis or hydrocyanic acid. An anodyne plaster of belladonna or opium may at the same time be applied to the præcordia.

Palpitation in weak and nervous persons of both sexes, not being plethoric or anæmic, is best treated by tonics and sedatives in combination. See *Mimosis Inquieta*, p. 288.)

In persons subject to nervous palpitations, it is of the first importance to procure tranquillity of mind; and as a fear of organic disease

of the heart is often present, the assurance of the medical man that the heart is free from structural disease will go far to effect a cure.

Irregular and intermittent pulsations of the heart often arise from the causes which produce nervous palpitations, especially from dyspepsia attended with flatulence, and are relieved by the same remedies. But they may depend on organic diseases of the heart. The pulse at the wrist and heart may be irregular and intermittent during health, become regular during acute disease, and return to its former condition during convalescence or recovery.

Pulsation in the epigastrium, like palpitation, is dependent upon various causes, and, like it, occurs in paroxysms, and in dyspeptic persons. Sometimes the pulsation is communicated to an intestine distended with gas or feces, and in this case it is apt to simulate aneurism. It is frequently removed by a brisk purgative, or by a course of aperient medicines.

ANGINA PECTORIS—BREAST PANG.

SYNONYM.—Syncope anginosa.

DEFINITION.—Sudden and acute pain in the chest, referred to the sternum, accompanied by intense anxiety and fear of death.

SYMPTOMS.—This disease generally occurs in persons having every appearance of good health. It consists of fits, or paroxysms, which come on during exercise, especially when walking up an ascent against the wind, or after a full meal. The attack is announced by a sudden and violent pain across the chest, extending down the left arm, or down both arms as far as the insertion of the deltoid muscles, and, in some cases, to the wrists, or fingers, accompanied with a sense of stricture so acute as to threaten immediate destruction. The patient is instantly obliged to stand still, and the moment he does so all the symptoms vanish. After repeated attacks of the disease, it is excited by slighter causes, and the paroxysms are more violent and of longer duration. It often occurs on the patient's waking from his first sleep, and he is, at times, incapable of lying down. At length, a fit more violent than usual puts an end to his existence, or death takes place suddenly without pain or any other warning. In the intervals the patient usually enjoys perfect health.

MORBID APPEARANCES.—Defective supply of blood to the muscular tissue of the heart, from absence of one or ossification of both coronary arteries, or of the valves of the heart; morbid accumulation of fat; atrophy of the heart, from fatty degeneration. In a few cases the disease has been caused by the pressure of tumours in the chest; in a few others it has been unexplained by any morbid appearance, and death has been attributed to spasm of the muscular tissue of the heart.

CAUSES.—*Predisposing.* The male sex; age above 50: it is rare in women. (Of nearly a hundred cases, three only occurred in

of a large number of the cases sudden death has been caused by a spasm of the coronary arteries, from a pain in the chest.

women, and one in a boy twelve years old. The rest were men, near or past 50 years of age.—Hcberden.) *Exciting*.—Violent exercise, strong mental emotion, and excess of all kinds: flatulence.

DIAGNOSIS.—The suddenness of the attack, the acute pain, and the intense anxiety are highly characteristic. From diseases of the lungs by the absence of dyspnoea: and from most diseases of the heart by the absence of palpitation.

PROGNOSIS.—The most probable termination of the disease is sudden death. This may happen in a fit, or it may occur without pain, the person being found in bed as if composedly asleep. The fatal event is often postponed to an advanced age. In a small number of cases the disease passes away without leaving any bad symptom behind.

TREATMENT.—*Indications*. I. In the paroxysm, to revive the failing action of the heart. II. In the interval, to regulate and invigorate its movements.

The first indication is fulfilled by the immediate administration of stimulants and antispasmodics, such as æther, ammonia, brandy and water, and strong coffee. The patient should always have at hand some diffusible stimulus, or combination of a diffusible stimulus with an opiate, such as experience has shown to be beneficial. (R. Spt. æther. fʒiiss. Liq. opii sedativ. fʒss. From 30 to 50 drops in a wine-glass of water, to be taken on each occurrence of a fit.)

In order to meet the second indication the patient should be directed to lead a quiet life, to put away all anxiety and excitement of mind, and to avoid hurried motion and strong muscular exertions, such as walking up hill. The diet should be light and nutritious; food should be taken often, and in small quantities. Whenever a feeling of weariness comes on, a little wine or brandy should be taken. Attention must be paid to the general health, and especially to the state of the pulmonary circulation.

A sudden sharp pain in the region of the heart sometimes attacks nervous persons, or persons who suffer from dyspepsia combined with flatulence. It has been attributed in some cases, and with apparent reason, to excessive indulgence in strong tea. On examination, the heart is found free from organic disease. The pain is not attended with the extreme anxiety of angina pectoris, and does not extend beyond the region of the heart. The treatment of this affection must depend on the state of the patient's health, and the ascertained cause of the individual paroxysms. Benefit is often derived from the application of a belladonna plaster to the region of the heart.

Spasm of the heart is described by Lacnec, though considered an imaginary disorder by Bouillaud, who states that there is no positive fact to attest its existence. But there is no reason why the heart should not suffer from spasm as well as other muscular organs.

The muscular structure of the heart would also seem to be the occasional seat of rheumatism; the symptoms being constant dull pain, increased at intervals, and palpitation, without any abnormal sound. In such cases, colchicum is indicated.

SYNCOPE—FAINTING.

SYMPTOMS.—A person about to be attacked with syncope experiences an indescribable distress. The eyesight fails, and objects appear to swim before the field of vision; there is a sense of singing or buzzing in the ears; the red colour leaves the lips; and the countenance becomes pale; a cold perspiration bedews the whole of the body; the senses fail; and the patient, if unsupported, falls senseless to the ground; the pulse and breathing are almost imperceptible. In some cases, not the smallest sign of life can be perceived, the face has a death-like pallor, the extremities are cold, the eyes closed, and the limbs flaccid. Recovery is announced by deep, prolonged sighs, and is frequently attended with vomiting or purging. It sometimes terminates in epileptic convulsions.

In milder cases the loss of sense is incomplete, the pulse is diminished in force and volume, the patient merely becomes pale and sick, and drops of sweat appear upon the brow.

DIAGNOSIS.—Syncope does not usually continue longer than a few seconds, but in some cases it persists for several minutes. In hysterical syncope the pulse beats as usual, the skin is warm, there is no pallor of countenance, and the eyelids vibrate.

CAUSE.—*Predisposing.* Nervous irritability and delicacy of constitution; debility, however induced; profuse evacuations, especially of blood; functional or organic diseases of the heart. *Exciting.*—Strong mental emotion; severe pain; loss of blood.

TREATMENT.—When syncope is purely nervous there is rarely any danger. The recumbent posture, a draught of fresh air, cold water sprinkled on the face and neck, and ammonia to the nostrils, will soon restore animation. Such articles of dress as impede respiration should be immediately loosened. Hysterical syncope must be treated by cold affusion.

When fainting fits are the result of diseases of the heart, the same remedies must be employed, and ammonia or hot brandy and water administered internally.

Since chloroform causes death chiefly by paralysing the heart's action, a few words on the administration of chloroform, and the treatment of the state of profound syncope sometimes induced by it, will be appropriate in this place.

Precautions to be used in the administration of Chloroform.—

1. The chest of the patient should be carefully examined, and if

there be any valvular defect of the heart, or intermittence of its action from debility or probable atrophy; or if there be any obstruction to the free action of the lungs, from tumours, interstitial deposits, or, *and most especially, emphysema*, the vapour of chloroform must not be administered.

2. The inhaler used should be so constructed that the rapidity of the evaporation of the chloroform shall, under all circumstances, be as nearly equal as possible; and the air contained in the reservoir never liable to become charged with more than six per centum of chloroform vapour. The instrument contrived by Dr. Sansom, and made by Mr. Matthews, provides these essential safeguards.

3. The receptacle containing the chloroform should be on a lower level than the patient's mouth, and carefully preserved in the perpendicular direction, otherwise the unmixed vapour of chloroform, which is four times heavier than air, will flow undiluted into the lungs of the patient.

4. The finger should remain on the pulse, and the eyes be directed to the chest and face without intermission during the whole of the process. If the pulse intermit, or fall below 60; or if the breathing become abnormally slow, or feeble and shallow, or the countenance exhibit a slightly livid colour, the inhalation must be promptly stopped.

The state of insensibility which it is desired to induce is marked by the following symptoms. Pulse and breathing, naturally tranquil; the expression of the countenance that of ordinary sleep. If there have been much noisy struggling in the first stage, it may appear a little congested. The eyelids closed and insensible, the eyeball fixed, and the pupil contracted, but respondent to the stimulus of light. The skin insensible and the limbs flaccid.

Chloroform kills by paralysing the heart, and death usually takes place with great rapidity, the breathing and pulse rapidly becoming slower, and, in a few seconds, imperceptible; the pupils dilated and insensible to light; the face pale and sometimes livid.

The *post-mortem appearances* due to the effect of chloroform, are congestion of the lungs, and an empty and flaccid condition of the heart; the blood is fluid.

The *means of resuscitation* should always be at hand, so that, if the formidable symptoms above mentioned appear, they may be promptly employed. They are strong ammonia, hot and cold water, artificial respiration, electricity. While ammonia is being applied to the nostrils and mouth, and a large sponge saturated with almost boiling water to the region of the heart, cold water should be dashed in the face, and artificial respiration employed, the tongue being pulled forcibly forwards. If these means fail, electricity (by means of the magneto-electric apparatus) may be applied to both sides of the body simultaneously—one electrode being placed on the side of the neck, the other on the side of the chest—the current being directed from above downwards.

STRUCTURAL DISEASES OF THE HEART AND PERICARDIUM.

PERICARDITIS . . .	Inflammation of the Pericardium.
ENDOCARDITIS . . .	Inflammation of the Endocardium.
CARDITIS . . .	Inflammation of the Substance of the Heart.
ATROPHY . . .	Fatty Degeneration of the Heart.
DISEASES OF THE VALVES OF THE HEART.	
HYPERTROPHY . . .	Enlargement of the Heart.
DILATATION . . .	Of the Heart.
CYANOSIS . . .	Blue Disease.
ENTOZOOIC DISEASE OF THE HEART.	

PERICARDITIS—INFLAMMATION OF THE PERICARDIUM.

VARIETIES.—1. Acute; 2. Chronic.

1. ACUTE PERICARDITIS.

Idiopathic pericarditis is of very rare occurrence. The disease is commonly an accompaniment of acute rheumatism.

SYMPTOMS.—After rigors, which are sometimes extremely severe, pain, more or less acute, under the left nipple and towards the inferior extremity of the sternum, occupying a part or the whole of the præcordial region, radiating towards the left axilla and arm, and sometimes extending down the left arm to the elbow or wrist. The pain may be pungent and lancinating, or dull and obscure; or there is merely a feeling of oppression. When pain is present, it is increased, when absent, often produced, by deep pressure in the intercostal spaces over the region of the heart, by upward pressure against the diaphragm, or by an attempt to lie on either side. There are also violent and often irregular palpitations either visible, or perceived only on placing the hand over the heart.

In addition to these symptoms, referable to the heart itself, there is more or less fever; a frequent, full, hard, regular, and *jarring* pulse, or a small, unequal, irregular, and very rapid one; dyspnoea, or respiration interrupted by sighs, sobs, or hiccough; an insupportable sense of oppression, restlessness, jactitation, and an urgent want of fresh air; the skin is often bathed in sweat, or it is very dry and hot; the countenance is pale, sharpened, and expressive of extreme anxiety and terror. Sometimes there are attacks of partial or general convulsions, or a slight and momentary delirium, and if the patient sleep, he awakes with fearful dreams; in other cases, there is complete insom-

nolence. The anxiety and agony are sometimes so insupportable that the slightest motion occasions an apprehension of sudden death. When the disease proves fatal, all the symptoms increase in severity, the breathing becomes more and more laborious, the countenance is livid, the eye glassy, the skin covered with a clammy sweat, and the patient expires amidst dreadful sufferings.

TERMINATIONS.—1. In complete recovery. 2. In chronic pericarditis. 3. In adhesion of the pericardium. 4. In death.

MORBID ANATOMY.—Effusion of serum, mixed with shreds of coagulable lymph, or with pus, and sometimes tinged with blood; rough deposits of lymph on the surface of the membrane; slight and soft adhesions between the two surfaces. The disease is frequently accompanied by more or less endocarditis.

DIAGNOSIS.—Difficult in certain cases. The disease is apt to be confounded with pleuritis, pneumonia, or even with simple fever. When the symptoms are strongly marked, it is difficult to confound it with any other disease, especially when the *physical* signs are taken into account.

Auscultation.—Within a few hours, or one or two days of the commencement of the disease, a superficial *to-and-fro* sound (*bruit de frottement*), caused by the mutual rubbing of the inflamed surfaces of the heart and the pericardium. It corresponds to the two sounds of the heart, and resembles the sound caused by rubbing the two hands backwards and forwards against each other. When the secretion of lymph is more consistent, it closely resembles the creaking of new leather (*bruit de cuir*), or in still more marked cases, the sound of a file or rasp (*bruit de scie, bruit de râpe*). As the secretion into the sac of the pericardium increases, or if the opposite surfaces become adherent, the *to-and-fro* sound disappears. The *to-and-fro* sound is first heard a little to the left of the mesial line, and about the centre of the sternum, whence it gradually extends over the entire præcordial space. It is often accompanied by a bellows sound synchronous with the systole of the heart, and this sound, which is *endocardial*, often remains when the *to-and-fro* sound has ceased. Sometimes it is very difficult to determine whether the sound be *endo-* or *exocardial*. The *exocardial* sound may be distinguished—1. By its nearness to the surface. 2. By its independence of the rhythm of the heart. 3. By its limitation to the region of the heart—*endocardial* sounds are frequently prolonged over the great vessels. 4. By its occasional disappearance and change of character. *Percussion* detects præcordial dulness, coextensive with the effusion. When there is much liquid effusion, the sounds of the heart are at first muffled, and in proportion as it increases, they become less and less distinct, until, in extreme cases, they are almost inaudible.

PROGNOSIS.—Complete recovery only occurs in those cases in which the effusion is fluid. Solid effusions generally lead to some roughening of the pericardium, or adhesion of the opposed surfaces.

CAUSES.—*Predisposing.* Hereditary tendency to rheumatic and gouty affections; male sex; age from 10 to 30. *Exciting.*—Cold, and, in the large majority of cases, the extension or metastasis of acute articular rheumatism; neighbouring inflammations of the pleura and lungs; renal disease; pyæmia.

TREATMENT.—*Indications.* 1. To subdue the existing inflammation. II. To promote the absorption of effused matters.

I. The first indication is fulfilled by general or local bleeding, according to the strength and state of the patient. If the disease come on suddenly in a vigorous plethoric person, blood may be taken from the arm, so as to make a decided impression on the pulse; and this may be followed by cupping or leeches over the region of the heart. But if the disease supervene, as it generally does, in the course of an attack of acute rheumatism, or in one whose strength is already reduced, topical bleeding by cupping or leeches will suffice. In no case should depleting measures be carried to excess. This part of the treatment may be assisted by purgatives, rest, and the antiphlogistic regimen; and when depletion has been carried to the proper extent, a blister may be applied over the region of the heart, and kept open for a time by the savin ointment.

II. The second indication is fulfilled by mercury freely given every one, two, or three hours, in combination with opium, and accompanied by mercurial inunction, till the gums are sore. In very acute forms of idiopathic pericarditis, the mercury may be combined with tartar emetic in doses of $\frac{1}{8}$ to $\frac{1}{4}$ of a grain; and in rheumatic pericarditis, with the extract of colchicum in doses of one, two, or three grains.

2. CHRONIC PERICARDITIS.

SYMPTOMS.—Palpitation and dyspnœa, accompanied sometimes with dry cough; inability to lie on the left side; slight pain or uneasiness in the region of the heart; low fever, with or without evening exacerbation; sense of oppression; great debility; and slow and imperfect convalescence, or a fatal termination in hydropericardium.

CAUSES.—Chronic pericarditis is generally a sequela of the acute form of the disease; but in debilitated constitutions, or when it comes on in the course of an attack of acute rheumatism, the symptoms are from the first much less severe, and sometimes very obscure.

TREATMENT.—Local depletion by cupping and leeches; blisters to the region of the heart; calomel and opium; or, where the disease is the consequence of rheumatism, colchicum, combined, if there be much debility, with ammonia. The convalescence should be carefully watched, violent exercise should be avoided, and a nourishing, unstimulating diet should be prescribed.

SEQUELÆ.—Important structural changes often remain when the symptoms of pericarditis, whether acute or chronic, have been removed. The pericardium may be thickened, and the subjacent capillary vessels

enlarged. There may be serum, or lymph, or pus in the pericardium, adhesions, partial or general, and organised deposits of fibrine, in the form of granulations and vegetations. The false membranes may also become fibro-cartilaginous, or even osseous. The effused fluid, or the thick false membranes, sometimes compress the heart so as to occasion atrophy. The internal sero-fibrous tissue of the heart sometimes presents the same alterations as the external covering (see Endocarditis). The muscular tissue of the heart may, like the serous, fibrous, and cellular tissue of the same organ, become thickened, and hypertrophied, indurated or softened, by the extension of the inflammation from the pericardium (see Carditis).

These changes may be detected by careful stethoscopic examination. The superficial to-and-fro sound synchronous with both sounds of the heart (see Acute Pericarditis), is generally characteristic of recent effusion, and disappears as the sac of the pleura becomes distended, or when adhesions are formed. The denser deposits on the surface of the pericardium are indicated by harsher and louder sounds, corresponding to the apex or base of the heart. Partial adhesions of the two layers of the pericardium are sometimes productive of no unusual sounds; at others, of some modification of the friction sounds. Extensive adhesions of the two layers of the pericardium generally lead to irregular action of the organ, and are accompanied by a well-marked retraction of the epigastrium, and hollowing of the intercostal spaces with each systole of the heart; and the heart's beat continues to be perceptible in the same spot, in all positions of the body, and in all states of the respiration. Extensive effusion into the sac of the pericardium constitutes Hydropericardium.

HYDRO-PERICARDIUM.

VARIETIES.—1. Active, from inflammatory action in the pericardium. 2. Passive, from obstruction to the circulation.

The symptoms of the *passive* form are generally obscure. They are, a sense of weight and oppression in the præcordia, great difficulty of breathing, a dusky, suffused countenance, a tendency to syncope, œdema, and a small, frequent, irregular pulse. The patient usually sits up in bed, and is afraid of the least exertion, or the slightest change of position.

LOCAL SIGNS.—When the effusion is considerable, prominence of the præcordia, with bulging of the intercostal spaces, extensive dulness, reaching sometimes from nipple to nipple, and nearly the whole length of the sternum; the pulsations of the heart imperceptible when the patient lies down, and shifting their place in the erect and semi-erect posture; the sounds indistinct in the region of the heart, but more audible at the upper part of the chest; the dulness on percussion varying its situation and extent with the posture of the patient. This part of the diagnosis requires the patient to assume successively the supine, and the erect or semi-erect postures, and to lie on either side.

PROGNOSIS.—Extremely unfavourable.

TREATMENT.—That of dropsies in general, by drastic purgatives and diuretics, modified according to the state of the patient and existing complications, and assisted by large blisters to the region of the heart, kept open by savin ointment. In a few cases, where the accumulation of serum has been very large, and the disease is free from other visceral complication, tapping has been practised with success. The spot selected for the operation is the fifth intercostal space, through which a trocar of small size is introduced—from below upwards.

ENDOCARDITIS—INFLAMMATION OF THE ENDOCARDIUM.

SYMPTOMS.—General feeling of uneasiness, anxiety, and oppression at the præcordia, with a tendency to syncope; but no pain, unless the disease be complicated with pericarditis or pleurisy. In the more severe cases there is well-marked fever, hot and dry skin, thirst, and restlessness; violent and irregular action of the heart, with a small, feeble, and often intermitting pulse; extreme anxiety; jaetitation; cold sweats; pale and shrunk features, expressive of extreme alarm; dyspnoea, faintness, or actual syncope; lividity of the lips and cheeks; slight swelling of the hands and feet; and short convulsive or epileptic seizures.

MORBID ANATOMY.—1. Redness of the endocardium, sometimes general, but more frequently partial; often confined to the valves alone, and generally accompanied by some thickening, infiltration, and softening of the membrane. 2. Effusion of coagulable lymph, in the form of white, elastic, glutinous masses, firmly attached to the free borders of the valves, adherent to the parietes of the heart, and entwined round the valvular tendons and fleshy columns, and often prolonged into the large vessels. 3. Vegetations or granulations, varying in size from that of a millet-seed to that of a small pea, single or clustered, round, cylindrical, or flattened, their surfaces smooth or rough, and when very numerous resembling the head of a cauliflower, are situated on the free borders of the valves, and sometimes on the internal surface of the cavities, and especially of the auricles. 4. These vegetations are often accompanied by fibro-cartilaginous or calcareous indurations of the valves, which contract the orifices of the heart so as to impede the circulation of the blood, and lay the foundations of other severe diseases of the organ. Sometimes the opposite borders of the valves are adherent.

CAUSES.—Those of pericarditis, which it often accompanies.

DIAGNOSIS.—The stethoscopic indications mentioned under diseases of the valves of the heart. The murmurs are generally of a low pitch,

and are sometimes musical. We cannot be sure of the existence of *acute* endocarditis unless the murmur be developed under observation.

PROGNOSIS AND TERMINATIONS.—The disease is rarely fatal in its acute stage. The duration of the disease is very various, and much influenced by the habits of the patient. It may continue for years, leading to a slowly-increasing embarrassment of the circulation; but it generally leaves behind it *chronic valvular disease*, which lays the foundation of *hypertrophy*, and increasing impediment to the circulation, ending either in sudden death or in dropsical effusions. If particles of fibrinous exudation become detached from the inflamed valves and carried along in the arteries, they may eventually block up some of the smaller branches, and thus produce the condition known as *embolism* and its consequences. (See page 497.)

TREATMENT.—That of pericarditis. In the acute form, and in vigorous subjects, active and prompt treatment is still more necessary than in pericarditis.

When endocarditis becomes chronic without organic disease, the symptoms may be alleviated by small and repeated bleedings, cupping, or leeching; gentle aperients; counter-irritants; the warm bath; repose; and a strictly-regulated diet.

CARDITIS, OR MYO-CARDITIS.

SYMPTOMS.—Carditis, or inflammation of the substance of the heart, rarely occurs as a distinct affection, and the post-mortem appearances which characterise it have generally been found combined with pericarditis, or endocarditis, or both. This, however, does not prove that the muscular tissue of the heart may not be separately affected, for it may be diseased, and yet the disease may not necessarily prove fatal. If articular rheumatism affecting the fibrous tissues of the joints may attack the fibrous tissues of the heart, there is the strongest reason from analogy to believe that muscular rheumatism, attacking the muscular fibre alone, may affect the heart in common with other muscles.

Such a disease would probably be characterised by simple palpitation, with strong and abrupt contractions of the organ, a very frequent, full, and bounding pulse, and a dull heavy sensation in the region of the heart, with paroxysms of severe darting or shooting pain in the heart itself, extending to the shoulders and down to the arms; with some degree of dyspnoea. These symptoms would accompany or follow muscular rheumatism in other parts of the body.

I have known such symptoms supervene on a severe attack of muscular rheumatism, without any indication of inflammation in the pericardium or endocardium. The treatment would be that of muscular rheumatism, with counter-irritation to the region of the heart, and, in the most severe cases, general or local depletion. (G.)

The existence of inflammation of the structure of the heart itself is proved by several recorded cases of softening, suppuration, ulceration, and perforation of the cardiac parietes. The symptoms during life are not sufficiently characteristic to admit of precise description.

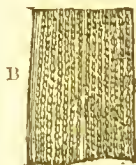
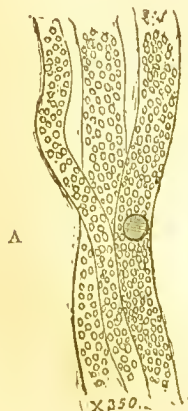
ATROPHY OF THE HEART.

SYMPTOMS.—Occasional fainting fits, and transient attacks of giddiness, in some cases, and the symptoms of angina pectoris in others. The most common termination of the disease is in sudden death under change of posture or slight exertion, the patient having previously suffered from debility, with great pallor of countenance and anasarca; but in some instances the patient is stout and apparently healthy. The respiration is sometimes affected in the manner described at p. 206. The pulsations of the heart are small and feeble, the impulse much weaker than natural, and scarcely felt by the hand, and the sounds indistinct. The least exertion renders the heart's action fast and irregular, and then the impulses become so feeble that some of them are not appreciable at the wrist. The pulse is very compressible, intermittent, and small, and, in a state of quietude, commonly below the natural frequency.

CAUSES.—*Predisposing.* The male sex; age above 50; habits of intemperance, combined with a sedentary life; exhausting diseases, such as hæmorrhage, typhus fever, pulmonary consumption, emphysema of long standing, and dropsy. *Proximate.*—Compression of the heart by deposits of fat, by effusion of fluid, by tumours, or by any other mechanical cause; carditis; disease of the coronary arteries, or congenital absence of one of them.

MORBID ANATOMY.—Fatty degeneration of the muscular tissue of the heart, which is found soft, flabby, and of a dirty dark brown, or pale drab colour. When incised a greasy film is left on the scalpel. In extreme cases the wall of either ventricle may be broken down between the thumb and finger. The fibres lose their faint striation, and the sarco-

Fig. 50.



matter is more or less completely changed into fat, which is observed in the form of distinct highly refractive spherules. (Fig. 50. The early, B, and latter stages, A, of fatty degeneration of the muscular fibres of the heart. In B the oily particles are arranged in rows, in A they are promiscuously distributed.) Fatty degeneration of the liver and kidneys, and of the aorta, emphysema of the lungs, and ulceration of the stomach, are frequent concomitants.

TREATMENT.—Nutritious diet, with tonics (among which steel is to be preferred) or stimulants, according to the degree of the existing debility; carriage exercise. Great watchfulness on the part of the attendants, if the condition be suspected during life. The disease itself does not admit of cure.

DISEASES OF THE VALVES OF THE HEART.

SYMPTOMS.—When the function of the valves of the heart is interfered with by disease, the blood is not only impeded in its flow out of the heart, but from defective closure of the diseased valves it is subject to reflux (regurgitation) back again into its cavities. Thus an obstruction to the circulation of blood through the heart is established. This leads to hypertrophy of the organ, and sooner or later to congestion of the lungs or other viscera, ultimately ending in grave diseases, of which dropsy is a frequent and prominent symptom. The symptoms attendant on diseases of the valves of the heart are by no means uniform; they vary with the particular valve which is the seat of the disease, and with the nature, extent, and duration of the morbid change itself. The general symptoms are palpitation, a tumultuous beat of the heart, a frequent pulse, a sense of weight, tightness, and oppression, sometimes accompanied by pain in the region of the heart and at the epigastrium; dyspnœa; an inability to lie on one or both of the sides; flatulency; frequent feelings of faintness and giddiness, or fits of syncope; an anxious expression of countenance, with slight knitting of the brows; the countenance sometimes pale, sometimes suffused. These symptoms are greatly increased by active exertion, walking up hill, or mounting the stairs, and by violent mental emotions. With a view of ascertaining the effects of valvular diseases upon the several parts of the circulation, and their influence in the production of disease of the viscera, it will be necessary to consider each valve separately, premising these two facts: first, that disease may affect more than one valve simultaneously; secondly, that while the valves on the left side of the heart are particularly prone to disease, those on the right side are very much less liable to morbid change.

Disease of the right auriculo-ventricular (tricuspid) valve, allowing regurgitation from the ventricle into the auricle.—*Proximate effects.* Slight hypertrophy of the right cavities of the heart, and increased præcordial dulness to the right; epigastric and right sternal impulse. A soft *systolic* murmur at ensiform cartilage. *Remote effects.*—Cervical veins distended, varicose, and pulsatile; when a finger is pressed upon them, they do not become empty below it; congestion of the venous circulation, producing corresponding obstruction to the arterial. The brain becomes oppressed and the patient suffers from congestive headache, and is liable to apoplexy. The liver immediately participates in the congestion and becomes engorged with blood and enlarged; as sequences, the portal circulation is impeded, and the mucous membrane

of the stomach and intestines congested, of which condition, thirst, piles, and the passage of blood from one or other, or from both extremities of the alimentary canal, are symptoms. The kidneys do not long escape congestion; and as a result the urine becomes scanty, and sooner or later albumen may be detected in it: ascites, oedema of the legs, and at last general anasarca, follow the congestion of the internal organs.

Disease of the right auriculo-ventricular orifice obstructing the flow of blood from the auricle into the ventricle.—If the tricuspid orifice be merely constricted, the action of the valves remaining perfect, there would be but slight congestion of the venous circulation without pulsation in the veins, and a *diastolic* murmur would probably be heard at the ensiform cartilage. But such a condition is exceedingly rare.

Disease of the pulmonary valves preventing closure of the orifice of the artery (permanent patency).—*Proximate effects.*—Hypertrophy of right cavities of the heart and its signs; and “along the sternum a well-marked *double murmur*, similar, in every respect, to that observed in the ordinary case of permanently open aortic valves, loudest at the base of the heart, and becoming less distinct as the stethoscope is moved towards the apex, where it ceases to be audible.” (Stokes.)—*Remote effects.* Dyspnoea, palpitation, some venous congestion.

Disease of the pulmonary valves obstructing the passage of blood into the lungs.—If the pulmonary orifice become contracted, the pressure of accumulated blood in the right ventricle will lead to regurgitation into the right auricle, followed by general venous congestion, as detailed under regurgitant disease of the tricuspid valve.

Disease of the pulmonary valves is exceedingly rare. Congenital deficiency is also infrequent.

Disease of the left auriculo-ventricular (mitral) valve, permitting regurgitation from the ventricle into the auricle.—*Proximate effects.* Enlargement of the left ventricle; increased præcordial dulness towards left side; apex-beat lower and more to the left; impulse greatly increased, often giving rise to a systolic thrill, which can be distinctly felt. A *systolic* murmur partially or completely obscuring the first sound of the heart, most distinct at the apex, and hardly or not at all heard at the base.—*Remote effects.* The only remote effect upon the general circulation is manifested in the pulse. The arteries do not receive their full share of blood, and the pulse is consequently small and contracted.

Disease of the left auriculo-ventricular orifice, causing obstruction to the flow of blood into the ventricle.—If the mitral disease result in contraction of the left auriculo-ventricular orifice, as is sooner or later the case, pulmonary symptoms in proportion to the contraction supervene. The lungs become congested, and there is constant liability to pulmonary hæmorrhage, evidenced by pulmonary apoplexy, or hæmo-

ptysis, often to a large amount. Dyspnœa is often very urgent. Bronchitis is a chronic symptom. Sooner or later the obstruction to the pulmonary circulation is felt on the right side of the heart, its cavities become enlarged, general venous congestion ensues, and its ultimate result, anasarca, appears. A soft *diastolic* murmur, best heard at the apex of the heart, and not masking the second sound, is diagnostic of contracted mitral orifice. Late on in the disease, when the heart becomes enfeebled and the orifice is much contracted, the murmur may be no longer heard. A woman (aged 32) was admitted into King's College Hospital with general anasarca and bronchitis; she had much hæmoptysis two months previously; the heart sounds were normal and distinct, pulse 100 and feeble; the urine was loaded with albumen. She died. The mitral orifice was hard, thickened, and contracted to a small rigid aperture, which barely admitted the tip of the little finger. (J. H.)

Disease of the aortic valves obstructing the exit of blood from the left ventricle (constriction of the orifice of the aorta).—Proximate effects. Great hypertrophy of the left ventricle; systolic thrill; strong heaving impulse; a loud harsh *systolic* murmur at mid-sternum, inaudible, or nearly so, at apex.—*Remote effects.* "The pulse is not materially affected; if the constriction be great, though regular in force and rhythm, it is small, hard, rigid, concentrated; hardness and force signify hypertrophy behind the narrowed orifice. Weakness of action of the heart, or extreme smoothness of the constricted orifice, may prevent the development of murmur, and the opening may be no larger than a pea, without leading to the very slightest œdema, even of the ankles." (Walshe.)

Disease of the aortic valves preventing the closure of the aortic orifice, and therefore allowing of regurgitation.—Proximate effects. Greatest hypertrophy of the left ventricle, and corresponding heavy prolonged impulse; diastolic and systolic thrill. A systolic, or diastolic, or both systolic and diastolic murmurs obliterating the first or second, or both, sounds of the heart, heard best at mid-sternum. The systolic murmur is distinctly heard in an upward direction towards the right shoulder; it is inaudible, or nearly so, at the apex. The diastolic murmur is best heard in a downward direction towards the apex, where it may become faint, or be still strongly pronounced.—*Remote effects.* A characteristic sudden jerking pulse. The pulsation of the superficial vessels is visible, and accompanied by considerable movement; slight pressure upon them often produces a sensible thrill.

Of all the affections of the valves of the heart this one produces the least injurious effect upon the circulation. Of itself it never causes dropsy. I have at present under my care a man of 65, who has had a systolic aortic bellows murmur for at least ten years, so loud that it may be heard over every part of the chest. He occasionally has a sharp attack of rheumatic gout, from which he soon recovers. He is an active man, and his occupation is somewhat laborious. (J. H.)

MORBID ANATOMY.—Dilatation of the orifices, so that the valves are

insufficient to close them; partial adhesion of the valves; contraction of the orifices with rigidity and roughening of the valves from fibrinous, atheromatous, cartilaginous, or bony deposits within their substance. Rupture of the valves or chordæ tendinæ.

DIAGNOSIS.—*Disease of the several valves and orifices of the heart* may be correctly diagnosed if attention be paid to the following points :—

1. The left side of the heart is much more frequently affected than the right.
2. When the right side of the heart is the seat of disease, the left side is generally affected also.
3. Diseases of the right side chiefly affect the venous circulation, causing regurgitation into the jugular veins, known as the venous pulse.
4. Diseases of the left side affect chiefly the arterial pulse, giving rise to irregularity and inequality.
5. Disease of the right side of the heart generally leads to dropsical effusions; disease of the left side to affections of the lungs; and disease of the aorta to head symptoms.
6. Sounds, whether on the right or left side, which accompany or take the place of the first sound of the heart, and are synchronous with the pulse, are due to the passage of the blood *out* of a ventricle—that is to say, to regurgitation into the corresponding auricle, or onward movement into the corresponding artery.
7. Sounds, whether on the right or left side, which accompany or take the place of the second sound of the heart, and are not synchronous with the pulse, are due to the entrance of blood *into* the ventricles, in consequence of the contraction of the corresponding auricles, or to regurgitation from the corresponding arteries.
8. Sounds which are heard at the base of the heart and in the course of the aorta towards the right clavicle, becoming less audible towards the apex of the heart, indicate disease of the valves or coats of the aorta. If the sound accompany the contraction of the ventricle, and be synchronous with a regular, equal, *thrilling* pulse, it is due to disease of the valves or coats of the aorta; but if the sound accompanying the diastole of the ventricle, be not synchronous with the pulse, which is, at the same time, abrupt and *jerking*, and the abrupt second sound of the heart be absent or very obscure, the sound is due to reflux through the open valves of the aorta.
9. If, on the other hand, the sound be synchronous with the systole of the ventricle, and with the pulse, the pulse, at the same time, wanting volume, the sound is due to the reflux of the blood from the left ventricle, through a diseased mitral valve, into the left auricle; but if the sound be not synchronous with the contraction of the ventricle, it is due to the passage of the blood from the auricle to the ventricle, through a diseased mitral valve.
10. The same rules apply to the right side of the heart. If the disease were in the pulmonary artery, the sound would be heard in the track of that vessel, towards the left clavicle.

CAUSES.—Rheumatic fever, chronic rheumatism, gout, Bright's disease of the kidneys, violent exertion, obstruction to the pulmonary circulation, atheromatous degeneration of the valves or great blood-vessels, aneurism of the aorta or pulmonary artery.

TREATMENT.—This must be directed to regulate the action of the heart and to prevent the tendency to dropsy, by relieving the systemic congestion. This may be effected by hydragogue purgatives, by the occasional and cautious abstraction of blood by a small orifice, great moderation in diet, and an absence from all violent exertions of the body, and from strong mental emotions. In the more advanced stages of the disease the treatment must be determined by the existing complications. The general principle of the treatment will be to avoid all excitement of the circulation, and the use of remedies which impair the power of the heart; at the same time relieving any unusual embarrassment of the circulation by moderate depletion. Undue action of the heart may be moderated by the interual use of digitalis, and the external application of belladonna or opium plasters.

HYPERTROPHY OF THE HEART.

Hypertrophy of the heart is the direct result of obstruction in some part of the circulation, of which obstruction it is, therefore, merely a symptom. Just as a muscle, or a set of muscles, becomes enlarged by extraordinary use, so is the heart in like manner hypertrophied by the increased exertion it makes to overcome any obstruction to the flow of the blood. The hypertrophy may affect the whole heart, or it may be limited to one or other of its chambers.

VARIETIES.—1. Simple hypertrophy. 2. Hypertrophy with dilatation.

SYMPTOMS.—Since the hypertrophy is exactly compensatory to the obstruction, its effects involve the heart alone, and the symptoms, therefore, which are associated with hypertrophy must be referred to the diseases which produce it, and not to the hypertrophy itself. The *physical signs* of enlargement of the heart are very distinct.

PHYSICAL SIGNS.—The impulse of the heart is greatly increased in force, is prolonged, and extends over a large space. It is visible to the eye, and forcibly raises the hand of the observer; the first sound of the heart is obscure, when there is little or no dilatation; louder, more abrupt, and heard over a larger space when the dilatation is considerable; the second sound obscure in the former case, unusually distinct in the latter. On percussion, there is dulness, varying with the degree of enlargement, and most extensive where dilatation is combined with hypertrophy. In some instances there is prominence and increased breadth of the left side of the chest. When the right side of the heart is affected, the dulness on percussion is most marked over the lower part of the sternum, and the impulse is felt in the infra-sternal fossa.

Complications.—Valvular disease, aneurism, dropsy, visceral enlargement, especially fatty degeneration of the liver and kidneys, emphysema, bronchitis, pulmonary apoplexy.

CAUSES.—Violent exertion, prolonged muscular efforts, as in gymnastic exercises, plethora, valvular diseases and obstructions in the large vessels or in the heart itself; pericarditis and endo-carditis; chronic diseases of the lungs, especially emphysema; diseases of the kidney.

PROGNOSIS and TREATMENT have reference to the diseases which produce the hypertrophy. (See Valvular Disease of the Heart.)

DILATATION OF THE HEART.

DEFINITION.—Dilatation of the cavities of the heart without corresponding increase of muscular tissue.

SYMPTOMS of *dilatation with thinness of the parietes*. This is most common on the right side. It is characterised by a fluttering of the heart; a full, frequent, weak, and irregular pulse. In extreme cases swelling of the veins of the neck, and distinct venous pulse; great dyspnoea; a dusky skin; a bloated and anxious countenance; drowsiness; slight delirium; dropsical effusions.

PHYSICAL SIGNS.—Impulse feeble, short and flapping, or tremulous, felt, however, over a greater extent than usual; first sound short and peculiarly distinct, heard over a great extent of the chest both before and behind.

CAUSES.—Debility, as in chlorosis. Obstruction to the pulmonary circulation, pulmonary emphysema, long-standing diseases of the lungs, valvular diseases of the heart.

PROGNOSIS.—Unfavourable when dependent on organic disease, but in the absence of severe complications, of dropsical effusions, or of great debility, the patient may survive for a considerable period.

TREATMENT.—Tonics. Repose of body and mind, careful regulation of the diet, aperient medicines. Gentle opiates and sedatives may occasionally be of service to allay irritability. If the circulation be greatly embarrassed, small bleedings by cupping or leeches may be had recourse to.

Partial dilatation, or true aneurism of the heart, consists in a protrusion of some portion of the parietes of the heart, in consequence of disease of the muscular tissue, and is an equally rare, obscure, and fatal disease. Its general symptoms differ little from those of more general dilatation of the cavities of the heart, and the physical signs are obscure; the prognosis of the disease, when recognised, is in the highest degree unfavourable, and the treatment similar to that for more general dilatation—complete repose of body and mind, the cautious use of narcotic and sedative remedies, and, in cases of extreme urgency, cautious local depletion. When the aneurism bursts, effusion into the pericardium takes place; the rupture is announced by a piercing cry of anguish, and death is usually instantaneous.

CYANOSIS—BLUE DISEASE.

SYMPTOMS.—A blue colour of the skin, lips, and lining membrane of the mouth; universal coldness of the surface; palpitation; fits of extreme dyspnoea, sometimes almost amounting to asphyxia; faintness, or actual syncope, on slight exertion, or from mental excitement; feeble and irregular pulse; œdema or dropsical effusions.

MORBID ANATOMY.—Various congenital deficiencies and malformations. A communication between the two sides of the heart, or between the two sets of vessels arising from it, with disproportionate strength of the two ventricles, generally combined with narrowing of the pulmonary artery. Extreme contraction of the pulmonary artery alone. Transposition of the aorta and pulmonary artery.

PHYSICAL SIGNS.—A very loud and superficial murmur immediately over the seat of the communication.

PROGNOSIS.—Death during a paroxysm at an early age; in rare instances the patient attains the adult age; and in one case recorded by Louis, the age of fifty-seven.

TREATMENT.—Rest of mind and body; pure air; warm clothing; strict diet; careful attention to the state of the stomach and bowels; and cautious treatment of complications.

DEVELOPMENT OF ECHINOCOCCUS IN THE HEART.

This is a rare disease; but as it may simulate valvular disease of the heart, and tubercular disease of the lungs, it is worthy of consideration here. The following case, which I had an opportunity of witnessing, came under Dr. Budd's care in King's College Hospital. It is reported in Vol. xxxviii., *Med. Times and Gazette*, 1858.

A well-nourished young woman, aged 23, was admitted with cough, muco-purulent bloody expectoration, and the physical signs of bronchitis; the countenance was purplish, and at times there was great dyspnoea; the legs were œdematous. On the day of her admission a systolic rasp sound was heard over the base of the heart, extending upwards to the right side; the præcordial dulness was extensive. The heart's impulse was tolerably strong, and the action regular: pulse about 90, and small. She continued under treatment, with a week's intermission, during which her symptoms abated, for about four months. Urgent dyspnoea, sometimes amounting to extreme orthopnoea, with lividity of the countenance, occasional hæmoptysis to a considerable extent, increase of the œdema, and its extension to the integuments of the trunk, with considerable ascites, marked the further advance of the disease. The abnormal cardiac sound was only heard occasionally, and its character and intensity varied from time to time; in the intervals the heart's sounds were normal. A month before her death she complained of sudden shooting pains through the left side of the chest, and

afterwards occasionally suffered intense pain in the precordia. She died suddenly, pale and gasping for breath, as if from obstruction of the pulmonary artery. The heart was enlarged, flattened in front, and bulged behind. An hydatid tumour, stuffed with secondary cysts of various sizes, and containing perfect echinocoeci, occupied the muscular substance of the apex. It had burst, and partially discharged its contents into the right ventricle. One of the escaped cysts, half an inch in diameter, and several smaller ones, were contained in the pulmonary artery just above the valves; and small clusters of them, as well as their collapsed skins, were found in its branches, on tracing them into the lungs. Clusters of cysts were also found in the centres of both lobes of the left lung. Old pleuritic and pericardial adhesions existed; the lower lobes of both lungs were hepatized.

The severe pulmonary symptoms and cardiac pain in this case were doubtless due to rupture of the primary and secondary cysts. The sudden death was probably caused by the presence of cysts in the pulmonary artery, obstructing the entrance of blood to the lungs.—(J. H.)

DISEASES OF THE ARTERIES.

OBLITERATION OF THE ARTERIES.

The arteries are liable to obliteration from any cause which produces for a time an arrest of the circulation through them. It appears that when their coats are inflamed the current of blood is retarded, until at last complete stagnation occurs; this is followed by coagulation, adhesion of the clot to the walls of the contracted tube, and its ultimate conversion into a fibrous cord. Obliteration is more commonly effected by a process termed by Virchow *embolia*, i.e., the impaction of clots, fibrinous concretions, or atheromatous matter, in the remote arteries.

SYMPTOMS.—Inflammatory obliteration is not necessarily attended by other than local symptoms, such as tenderness and hardness of the inflamed vessel. The process is usually sufficiently slow to allow of the establishment of collateral circulations. If more than one of the main trunks leading to a part be simultaneously affected, dry gangrene would of course result. Embolism, when occurring in the extremities, would also result in gangrene. If it occur in the internal carotids, softening of the brain, loss of vision, and hemiplegia may, one or all, result. If the pulmonary artery be blocked up by a clot arrested at its bifurcation, death, more or less sudden, from asphyxia, will be the consequence. If the smaller superficial arteries be the seat of the embolism, sloughing ulcers may ensue.

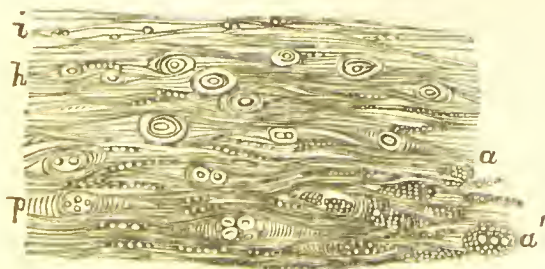
ATHEROMA.

Under this term are included both fatty and calcareous degenerations of the blood-vessels, atheroma proper being an intermediate condition. After the age of fifty the walls of the blood-vessels are very liable to degeneration. The aorta, in particular, becomes dilated, the elasticity of its wall impaired, and its inner surface roughened by large, irregular, whitish, elevated patches of morbid matter, lying immediately beneath a superficial layer of the inner coat, and composed of a mixture of earthy and fatty matter.

SYMPTOMS.—When the disease affects the smaller arteries, such as the radial and temporal, they become rigid and tortuous, and feel like cords under the finger. A dilated and atheromatous condition of the aorta is indicated by a loud systolic bellows murmur, commencing at the mid-sternum, and extending thence towards the right shoulder, being loudest to the right of the sternum, by which it is distinguished from murmurs due to disease of the aortic valves. Atheromatous disease of these valves is, however, very frequently associated with a similar degeneration of the contiguous part of the aorta. Owing to the diminished elasticity of the diseased artery, the pulse has the same sudden, jerking character as it possesses in disease of the aortic valves allowing of regurgitation. See page 487.

MORBID ANATOMY.—At first a whitish opaque spot is observed on the inner surface of the artery. It consists of a fatty degeneration of its tissues, immediately beneath the innermost layer. A vertical section presents the appearance shown in fig. 51. *i* is the unaltered innermost layer; at *h* the corpuscles of connective tissue are enlarged; at *p* these cells are observed to be multiplying; at *a* the fatty degeneration in these cells is seen commencing; at *a'* they have attained to an advanced stage of fatty degeneration.

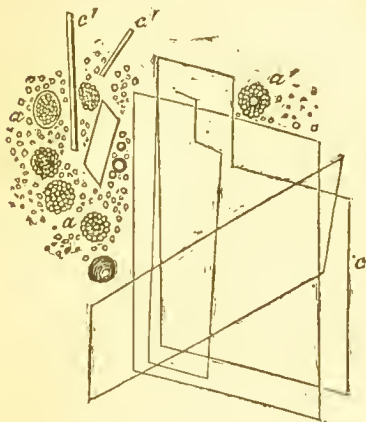
Fig. 51.



The next stage of the process consists in the deposit of molecules of

earthy matter, and the separation of cholesterin. If we examine the disintegrated portion of the arterial wall at this stage, we shall observe large rhombic plates or prisms of cholesterin, *c c c*; and metamorphosed

Fig. 52.



cells of the internal coat transformed into fatty-granule globules *a a*, imbedded in free granular matter, composed in part of earthy matter, and in part of free large and small drops of oil.—Virchow, op. cit. These accumulated deposits either form a pultaceous matter, which may be discharged into the blood through an aperture formed in the internal coat, leaving the so-called atheromatous ulcer; or they may, by the increase of the earthy particles, become petrified into irregular ossific plates. In the smaller arteries the ossification proceeds much more uniformly, and they become at last more or less completely converted into smooth bony tubes.

The capillaries are equally liable with the arteries to degeneration. When their walls are invaded with fat, they present the appearance represented in fig. 52.

As a result of this condition their elasticity and contractility is proportionately impaired, they become permanently dilated, and the blood tends to become stagnant in them.

EFFECTS.—*Proximate.* Rupture; atheromatous ulceration of the inner coat, with aneurismal dilatation of the outer; dilatation resulting first in congestion, and finally in rupture of the capillaries, especially those of the brain, causing sanguineous apoplexy. *Remote.*—Hypertrophy of the heart; embolism.

CAUSES.—The rheumatic and gouty diathesis.

TREATMENT.—The avoidance of hurry, exertion, and fatigue; animal diet; tonics in combination with alkalies.

ANEURISM OF THE AORTA.

VARIETIES.—1. Thoracic; 2. Abdominal.

1. ANEURISM OF THE THORACIC AORTA.

SYMPTOMS.—The general symptoms produced by an aneurismal tumour in the chest are the same as those due to any other tumour of equal size and similar situation—*dyspnœa*, and more or less consolidation of the lung from pressure of the aneurismal tumour; a harsh, harassing cough, with little or no expectoration, from pressure on the bronchial tubes; *aphonia*, and paroxysmal constriction of the glottis, from tension of the recurrent laryngeal nerves; *dysphagia*, from pressure on the œsophagus; *obstruction to the venous circulation*, accompanied, in extreme cases, by dropsical effusions into the cellular membrane of the face, neck, chest, and upper extremities, from compression of the large venous trunks; *neuralgia of the back*, and *paraplegia*, from pressure on the spine, followed by absorption of the vertebræ; *inaction*, from pressure on the thoracic duct, has also been supposed to be a result of aneurism.

DIAGNOSIS.—Difficult, when the tumour occupies the origin of the aorta, or when, whatever its situation, it is of small size.

When the tumour involves the *arch of the aorta*, or its first branches, and especially when it has so far increased as to rise out of the chest, the diagnosis becomes comparatively easy. When, again, the tumour, by its gradual increase in size, causes the protrusion of the sternum or ribs, or leads to their absorption, the strong heaving impulse of the tumour, and thoracic dulness proportionate to its extent, will make the diagnosis certain.

A *whizzing* sound, or a bellows murmur, sometimes single, more rarely double, is usually heard in the situation of the tumour; but these sounds are not always present, neither are they to be depended upon in the absence of other symptoms, since they may be produced by any tumour pressing upon the great vessels at the base of the heart. Other symptoms, such as a peculiar thrilling sensation communicated to the hand, and a quick thrilling pulse, are occasionally present. When the tumour occupies the arch of the aorta, or the large vessels of the neck, or upper extremity, we may expect to find some marked inequality in the pulsations of the radial and carotid arteries. Sometimes there is an absence of the pulse at the wrist, of one or of both arms, and occasionally of one or both carotid arteries; and there are signs of disturbed circulation through the brain, such as giddiness, faintness, and indistinctness of vision. Hæmorrhage from the lungs or stomach will have additional value as a sign of aneurism in the ascertained absence of symptoms of pulmonary consumption and obstruction to the portal circulation; if the tumour be at all large, dulness and

bronchophony in proportion to the compression of the lung will be observed. A sensation of throbbing in the chest, difficulty of deglutition, and, in the later stages, vomiting and spasmodic dyspnoea complete the evidences of thoracic aneurism.

PROGNOSIS.—Unfavourable; but the disease may last for a considerable period before it proves fatal.

TREATMENT.—Perfect repose of mind and body, temperance, a cool moderate diet, a free state of bowels, occasional cautious depletion when urgent symptoms require it; a belladonna plaster to the region of the heart, and digitalis in small and repeated doses to moderate the action of the heart. The dry harsh cough will require the use of sedatives (extract of conium or stramonium), with expectorants (such as the compound squill pill); and anasarca must be treated by the remedies prescribed under that head.

2. ANEURISM OF THE ABDOMINAL AORTA.

SYMPTOMS.—These vary with the size and situation of the tumour, and the viscera upon which it presses. When the aneurism presses on the stomach, it gives rise to severe symptoms of dyspepsia; on the nerves of the solar plexus, to neuralgic pains; on the bowels, to obstinate constipation or violent colic; on the nerves issuing from the spine, to severe pain in the loins, abdominal parietes, or lower extremities, simulating rheumatism of those parts, sciatica, lumbar and psoas abscess, or disease of the spine. By pressure on the rectum, it has sometimes led to a suspicion of stricture of that part, and it has been confounded with disease of the liver, spleen, and kidney. When the tumour occupies the upper portion of the abdominal aorta, it may thrust up the diaphragm, and give rise to dyspnoea, and other symptoms of pulmonary disease.

DIAGNOSIS.—By careful examination the tumour may often be found to occupy the situation of the aorta; it may be felt strongly pulsating, and having the peculiar *thrill* above mentioned, and on applying the stethoscope, a short, harsh, bellows murmur may be distinctly heard. The pulsation is more uniformly diffused over an aneurismal tumour, than over any other abdominal tumour lying over the aorta; and the bellows sound is more harsh and grating than that occasioned by the pressure of such other tumours. It should be borne in mind that the pulsation of a healthy aorta may be communicated to a loaded intestine or other tumour seated over it.

The prognosis and treatment are the same as those of aneurism of the thoracic aorta.

MORBID ANATOMY.—Laceration of the internal coats of the artery, and saccular dilatation of the external. Extravasation of blood between

the layers of the artery, causing their dissection and dilatation. But the commonest cause of aneurism is fatty or atheromatous degeneration of the artery, allowing of dilatation of all its coats.

DISEASES OF THE VEINS.

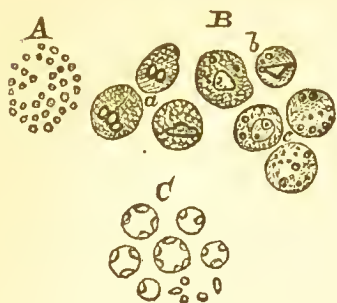
PHLEBITIS	Inflammation of the Veins.
PHLEGMASIA DOLENS .	White Leg.

PRELIMINARY OBSERVATIONS.—*Thrombosis, Embolia, and Pyæmia.*
—Before describing diseases of the veins it is necessary to say a few words on the formation of clots in the circulatory organs, to which process the term *thrombosis* has been given. Foreign matters when introduced into the blood induce its coagulation upon their surfaces. This is true of solid metallic bodies, such as iron; and of liquids, such as mercury and pus. Further, a clot of fibrine, or even of the blood itself formed within the blood-vessels, tends to increase by superposition of layer upon layer of coagulum. Thrombosis, therefore, may be caused by phlebitis, arteritis, and endocarditis, in consequence of solid inflammatory exudations upon the inner surface of the veins, arteries, or heart. A film of coagulum is formed upon the roughened inflamed surface; and, subsequently, layer after layer is deposited until a clot or thrombus of considerable size is formed, which is attached by one extremity to the inflamed surface upon which it was formed, while the other extremity may freely vibrate in the passing current of blood, or it may reach over to the other side of the vessel and obstruct the passage of blood from below.

The subsequent changes affecting these clots give rise to some of the most interesting and important pathological processes. If they slowly deliquesce without undergoing further change, no bad effects result. If the entire thrombus, or a large fragment of it be detached, it may be carried from a large vein into the pulmonary artery, and produce instantaneous suffocation; thrombi from the left side of the heart may become impacted in a carotid or brachial artery; clots from the surface of the aorta may block up any of its branches: in either case sloughing ulceration of a part, or mortification of the whole limb, will most probably ensue. If the clot undergo gradually disintegration into fine particles, these will be arrested in the capillary circulation, giving rise to *capillary embolia*, resulting in softening or ulcerative degeneration of the contiguous part. But even still greater evils may result from the presence of clots in the circulation. If we examine these thrombi, we shall frequently find their central parts softened, and occupied by a puriform mass, caused by transformation of the central parts of the clots themselves. Under the microscope, this disintegrated matter is found to be composed of granules (A, fig. 53) derived from the disintegrated fibrin; corpuscles undistinguishable from pus corpuscles (B); and altered blood discs (C). “Even when yet quite recent thrombi

are examined, the (pyoid) corpuscles are found in many places heaped up in great masses, so that, when the fibrine breaks up, they are set free in such numbers, that the débris are nearly as rich in cells as pus.* Now, the question arises, what are these cells? Virchow says, "Colourless blood corpuscles set free by the softening;" others consider them to be true pus cells. We coincide entirely with the latter view, for the following reasons. 1. The colourless corpuscles do not exist in sufficient numbers in the blood to form these "great masses," and we want other evi-

Fig. 53.



dence to prove that leucocytosis can take place to this extent in the blood itself. 2. From the effects of the metamorphosis above described, which we believe to be those of pyæmia. Whether the pus cells be derived externally from a suppurating wound, in the manner described under pyæmia at p. 372, or internally from purulent metamorphosis of the clot itself, the result is the same. Wherever they are carried, the pus cells form the nuclei of other clots, which, in process of time, become centres of suppurative inflammation; and thus abscesses may be simultaneously deposited in all parts of the body. (J. H.)

PHLEBITIS—INFLAMMATION OF THE VEINS.

VARIETIES.—Adhesive, and suppurative (pyæmia).

PATHOLOGY.—Idiopathic adhesive phlebitis commences in inflammation of the coat of the vein, causing its dilatation and such impairment or loss of contractility, that stagnation and subsequently coagulation of the blood in the interior result. The disease is strictly local at first, and if the coagulated blood be very gradually disintegrated or absorbed, it may remain so, and the vein may be ultimately restored to its original condition. If, however, portions of the coagula become detached, embolism may result. If they undergo purulent degeneration, the phenomena of suppurative phlebitis (pyæmia) appear.

SYMPTOMS.—When occurring in the superficial veins, swelling and induration, sometimes accompanied by redness, in the course of the veins; pain increased by pressure; œdema of the cellular tissue, and enlargement of the veins below the seat of the disease. When the disease assumes the suppurative form, then arise all the symptoms of pyæmia (see p. 371), namely rigors, followed by profuse sweats, often-

* Virchow, op. cit. p. 201.

sive diarrhœa, great debility, anxiety, and irritability; a very frequent, weak, and sometimes intermittent pulse; a dry, brown tongue; and a sallow skin. As the disease advances, the joints often become painful and tender, symptoms of inflammation of the viscera, or their serous investments, show themselves, and collections of pus, with little or no inflammation of the surrounding textures, form in different parts of the body.

CAUSES.—*Predisposing.* Cachexia. *Exciting.*—In rare instances, cold; in most cases, inflammation spreading from surrounding tissues, or injury done to the veins themselves, as in bleeding, amputation, extraction of tumours, tying varicose veins, and operations for hæmorrhoids. Phlebitis is also apt to supervene on fractures, or on operations performed on bones; and it often originates in injuries to the veins of the internal viscera, as of the uterus after childbirth, and the umbilical cord of new-born children.

MORBID ANATOMY.—Discoloration of the inner coat of the vein; inflammation and thickening of the other coats; inflammation and suppuration of the surrounding textures; formation of coagula and pus within the vein, diffuse suppuration of the cellular tissue surrounding the lungs or liver; deposits of pus in the joints and serous cavities, or in the vein, spleen, or kidneys; but more especially in the lungs and liver.

DIAGNOSIS.—From *inflammation of the absorbents*, by the absence of superficial redness and the larger size of the inflamed vessel, which feels like a large, hard, knotted cord.

PROGNOSIS.—Unfavourable, but guarded; more favourable in inflammation of the external veins, and especially when it arises spontaneously or from cold. Less favourable in phlebitis following wounds, or injury to the veins of the internal viscera. Secondary abscesses in external parts of the body may be regarded as a favourable indication.

TREATMENT.—Leeches in the course of the inflamed vessel. A position favourable to the return of blood to the heart. Warm fomentations, or, if more agreeable to the patient, cold lotions. If the accompanying fever be of the inflammatory type, tartar-emetic and aperients, or calomel and opium; if of the typhous character, wine, brandy, and diffusible stimulants, in combination with opium. In most cases the strength must be supported by bark or quinine, with a liberal allowance of wine or brandy. Close attention should be paid to uneasiness or pain in parts of the body remote from the seat of the disease, as indicating collections of pus requiring prompt relief by the knife.

PHLEGMASIA DOLENS—WHITE LEG.

DEFINITION.—Obstruction, usually of an inflammatory character, of the femoral vein, or of the femoral and iliac veins.

SYNONYM.—Phlegmasia alba.

SYMPTOMS.—From one to five weeks after delivery, a painful elastic swelling of one or both lower extremities, beginning generally in the groin, labia, and thigh, and thence extending downwards; characterised by great heat and tenderness, a pale, shining appearance of the surface, and stiffness of the limb. It is commonly ushered in by rigors, with pains in the loins or belly; and is accompanied by fever, thirst, a quick and frequent pulse, headache, nausea, and a furred tongue.

CAUSES.—*Predisposing.* The puerperal state. *Exciting.*—Inflammation of the iliac and femoral veins, generally commencing in the veins of the uterus and viscera of the pelvis.

PATHOLOGY AND MORBID ANATOMY.—Those of adhesive phlebitis. (See pp. 496, 497.)

DIAGNOSIS.—From *œdema*, by the absence of pitting on pressure. From *common inflammation* by the pale, shining aspect of the surface.

PROGNOSIS.—Generally favourable, but recovery often tardy.

TREATMENT.—In acute cases, leeches to the most painful parts of the limb, followed by warm fomentations; opium in large doses, with calomel or blue pill, given so as to affect the mouth. From half a grain to a grain of opium, with two grains of blue pill, may be given three or four times a-day, till the system is sensibly affected. The limb should be placed in the horizontal position or slightly raised; and the bowels should be kept free. If much fever be present, a sixth of a grain of tartar-emetic may be combined with the opium and blue pill. In chronic cases, after the inflammation has subsided, iodide of potassium (gr. iij. to gr. v.) in combination with the decoction of sarsaparilla: infrictions of mercurial or iodine ointments.

CHAPTER III.

DISEASES OF THE ORGANS OF RESPIRATION.

1. Of the Larynx and Trachea.
2. Of the Bronchial-tubes and Air-cells.
3. Of the Substance of the Lungs.
4. Of the Pleura.

DISEASES OF THE LARYNX AND TRACHEA.

LARYNGITIS Inflammation of the Larynx.

OTHER DISEASES OF THE
LARYNX.

TRACHEITIS Croup.

LARYNGISMUS STRIDULUS Crowing inspiration.

LARYNGITIS—INFLAMMATION OF THE LARYNX.

SYNONYM.—Cynanche laryngea.

VARIETIES.—1. Acute; 2. Chronic.

1. ACUTE LARYNGITIS.

SYMPTOMS.—The disease sets in with rigors, followed by pyrexia, and usually by some degree of inflammation in the tonsils, a hoarse voice, a husky and convulsive cough, and constant hawking of glutinous mucus. There is also a sense of pain and constriction in the larynx, generally increased by pressure. The respiration is difficult and sonorous. There is great pain in deglutition, and particles of food and liquid are apt to get into the glottis, which is imperfectly closed by the inflamed epiglottis, and painful choking cough is induced. The act of swallowing is painful, and is often followed by convulsive fits of coughing, and dyspnoea. On examination the fauces are generally found red and swollen; and, if the tongue be pressed downwards and forwards, the epiglottis may be seen thickened, inflamed, and erected. There is inflammatory fever, with flushed face, hot skin, and full, hard pulse. These symptoms are followed by others of a more formidable character. The countenance becomes pale and anxious; the lips livid; the eyes suffused; the nostrils expanded; the pulse frequent, feeble, and irregular; the voice reduced to a whisper, or lost; the throat often œdematous. There is extreme restlessness and jactitation, and urgent fear of suffocation. The patient is obliged to maintain the sitting posture, and if he fall asleep he soon awakes dreadfully agitated, gasping and struggling for breath. Delirium and coma ensue, and

death takes place in from four to five days. But the patient may die of apnœa at a much earlier period.

MORBID ANATOMY.—Injection and thickening of the lining membrane of the larynx, with œdema of the submucous tissue, and surrounding cellular membrane, the glottis and epiglottis red and swollen; and containing serum, sero-purulent fluid, or pus. In some cases, œdema of the glottis is the only post-mortem appearance.

DIAGNOSIS.—From *spasmodic affections of the larynx*, by the presence of fever and local pain, and by the gradual progress of the disease; from *tracheitis*, by the absence of the peculiar stridulous voice, and of the croupy inspiration. The subjects of laryngitis are also, as a general rule, much older than patients suffering from croup.

PROGNOSIS.—Most unfavourable; especially if the disease have already lasted some time, without any abatement of the symptoms, or if the dyspnœa be extreme, the convulsive fits of frequent occurrence, the face livid, the circulation languid, and the head affected. On the other hand, a decrease of dyspnœa, a free expectoration, an improved aspect of countenance, and greater ease in swallowing, are favourable signs.

CAUSES.—*Predisposing.* Previous attacks of quinsy, intemperance, abuse of mercury, frequent and continued exertions of the voice; the adult age. *Exciting.*—Exposure to wet and cold; extension of inflammation from the tonsils or salivary glands; swallowing scalding or corrosive liquids; inhaling acrid gases or hot air; extension of inflammation in erysipelas, scarlatina, small-pox, measles, and diphtheria.

TREATMENT.—*Indications.* I. To reduce inflammatory action and prevent effusion. II. Effusion having taken place, to promote the absorption of the effused matter. III. In extreme cases, to prevent suffocation.

I. Inflammatory action can be reduced, and effusion prevented only by the most prompt and active measures:—By the application of from two to six leeches over the part, followed by tartarized antimony, in combination with calomel and opium in full doses. A grain of calomel, with from an eighth to a sixth of a grain of tartarized antimony, and a third or half of a grain of opium may be given every one, two, or three hours, according to the urgency of the symptoms. The object of this treatment is to reduce inflammation by the tartar-emetic, to supersede inflammatory action by the mercury, and to soothe existing irritation by the opium. Ice should be held in the mouth, and applied around the throat.

II. The second indication is fulfilled by mercury. It may be taken internally, combined with opium and tartar-emetic as just recommended, and it may be rubbed in at the same time. When effusion has actually taken place, bleeding is of little use, except to counteract urgent symptoms. Counter-irritation may now be employed with advantage in the form of blisters to the side of the neck.

When laryngitis supervenes on other diseases, the treatment must be modified according to the disease that may be present, and the existing state of the system.

III. The mechanical effects of the inflammation and effusion can be obviated, and the obstruction to the respiration removed only by making an opening into the trachea. When, in spite of remedies, the dyspnoea increases rapidly, and there is urgent danger of suffocation, an operation should be resorted to without loss of time.

Throughout the treatment the patient should be prevented from talking.

2. CHRONIC LARYNGITIS.

SYMPTOMS.—Hoarseness, sometimes increasing till the voice is reduced to a whisper, or quite lost; dry, husky cough; pain or soreness in the larynx, increased by lateral or backward pressure. The cough is brought on by any unusual exertion, or by the inhalation of cold air, and is accompanied, in the first stage, with scanty mucous expectoration; in more advanced cases, and where ulceration is present, the sputa are purulent, and mixed with streaks of blood; or sanious and foetid. In confirmed cases, dyspnoea is an invariable attendant, coming on generally in paroxysms, and leaving the patient nearly free in the intervals. In the last stage of the disease, the dyspnoea is increased to orthopnoea, obliging the patient, during the fits, to sit up in bed. In the intervals of the fits the breathing has a peculiar hissing sound. The patient does not long survive the appearance of orthopnoea, and generally dies asphyxiated.

MORBID ANATOMY.—Inflammation and its consequences in the mucous and submucous textures of the larynx; enlargement of the mucous follicles; oedema; ulceration of the mucous membrane; ossification, or caries of the cartilages.

CAUSES.—The acute form, of which it is often the sequel; catarrh; indulgence in spirituous liquors; excessive exertions of the voice; injuries to the larynx; the inhalation of air loaded with dust or irritating particles of matter; syphilis; the abuse of mercury; tubercular matter deposited in the mucous membrane of the larynx. Ulceration from this last-named cause occurred in about a fourth of the cases of phthisis quoted by Louis.

DIAGNOSIS.—By the permanent change of the voice, the cough, the hissing breathing, and the pain or tenderness in the larynx. Tubercular laryngitis may be distinguished from simple inflammation or relaxation, by the coexistence of the symptoms and physical signs of phthisis. Syphilitic laryngitis is known by the coexistence of other secondary symptoms.

PROGNOSIS.—*Favourable.* The absence of signs of disease of the chest; the catarrhal or syphilitic varieties of the disease. *Unfavourable.*—The continuance of the symptoms, without intervals of

freedom, and increasing difficulty of deglutition from the spasmodic cough caused by the passage of food into the air-tubes.

TREATMENT.—*Indications.* I. To reduce the chronic inflammation. II. To promote the absorption of effused fluids. III. In cases of relaxation of the mucous membrane, to restore tone to the part. IV. To relieve urgent symptoms. V. To improve the general health.

I. The chronic inflammation of the larynx may be subdued by the repeated application of a few leeches to the upper part of the throat, and by counter-irritants, such as blisters, mustard-poultices, and tartar-emetic ointment. The part itself should, at the same time, be kept at rest, the patient being prevented from talking more than is necessary.

II. To fulfil the second indication, and especially if the disease have a syphilitic origin, mercury should be given in small doses, so as to affect the mouth, or the iodide of potassium, in five-grain doses, three or four times a day.

III. To restore the tone of the relaxed mucous membrane, various remedies have been recommended: the inhalation of steam holding some gentle stimulant in solution, as kreasote, camphor, turpentine, or one of the balsams; or the still stronger stimulants, applied directly to the part, in a liquid or solid form. Nitrate of silver, corrosive sublimate, and sulphate of copper, have been recommended for this purpose. The preference should be given to a strong solution of the nitrate of silver, applied by means of a small probang to the epiglottis and upper part of the larynx. If solid substances be preferred, they must be used in the form of an impalpable powder, and drawn into the larynx through a tube. Nitrate of bismuth; calomel with twelve times its weight of sugar; red precipitate, sulphate of zinc, or sulphate of copper, mixed with thirty-six times their weight of sugar; alum with twice its weight; and acetate of lead with seven times its weight—are remedies suitable for this purpose.

IV. The urgent symptoms consist chiefly in paroxysms of dyspnoea or convulsive cough. These may be relieved by narcotics and sedatives, such as opium, æther, camphor, belladonna, or stramonium, inhaled or given internally. Solid medicines may be most advantageously given in the form of lozenges. When deglutition becomes impaired, it may be necessary to feed the patient by means of the œsophageal tube and the stomach-pump. Where urgent symptoms are found to admit of no relief, tracheotomy may be necessary.

V. The improvement of the general health may be effected by tonics, especially iron, and the mineral acids, nourishing and wholesome diet, bracing air, the cold or shower bath, and strict attention to the functions of the stomach and bowels, and to the state of the secretions generally.

OTHER DISEASES OF THE LARYNX—APHONIA.

Every condition which impairs the function of the vocal cords produces a corresponding loss of voice. The causes of aphonia are therefore very numerous; and in order to positively determine them, the use of the laryngoscope is indispensable. The apparatus consists merely of

two mirrors, one for the forehead (the *frontal*),* the other the mouth (the *laryngeal*). Its use is exceedingly simple and readily acquired. In the absence of direct sunlight, which is always to be preferred to artificial light, let the patient be seated in a dark room, and place an argand gas burner or moderator lamp behind his right shoulder, and so far behind it that the face is in the shade, the light being on a level with the eye of the operator as he is seated in front of the patient. The head of the patient being extended a little backwards, and the face directed straightforwards, throw the light from the mirror on the forehead into the back of the mouth against the soft palate. The distance between the frontal mirror and the mouth of the patient must be such as to give the brightest illumination of the soft palate; the distance of about a foot will secure this. If the patient cannot command the tongue so as to let it lie relaxed on the floor of the mouth, the extremity, being covered with a handkerchief, should be seized between the thumb and finger, and drawn forwards over the lower front teeth.

The laryngeal mirror is now warmed, by passing it twice or thrice above the flame of the lamp, and introduced to the isthmus of the fauces and just within the pharynx, so as to tuck up the uvula and soft palate above and behind it. Contact with the tongue and back of the pharynx must be cautiously avoided, otherwise expulsive action is excited. On depressing the handle of the mirror the back of the tongue, the epiglottis, and finally the vocal cords and parts bounding the aperture of the glottis are brought into view (fig. 54). In some

Fig. 54.

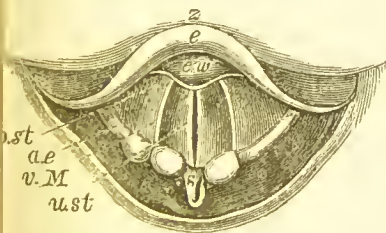
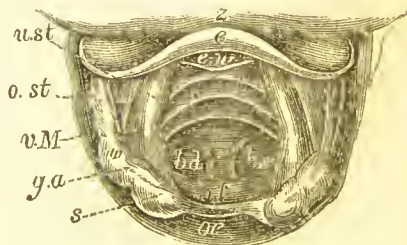


Fig. 55.



z, base of the tongue. e, epiglottis. ew, cushion of the epiglottis. s, cartilages of Santorini, covering over the apices of the arytenoid cartilages. w, cartilage of Wrisberg lying in the fold of membrane which extends from the summit of the arytenoid cartilage, on either side, to the epiglottis. ga, tubercle which sometimes exists between the cartilage of Santorini and Wrisberg. u.st, inferior, or true vocal cords. o.st, superior, or false vocal cords. v.M, the depressions between them leading to the ventricles of the larynx. a.e, aryteno-epiglottic ligament, lying in the aryteno-epiglottic folds of mucous membrane. u.l, rings of trachea. bd, bs, right and left bronchus. (Dr. Czermak)

persons, and under favourable circumstances, the rings of the trachea, and the apertures of the right and left bronchi may be seen as the patient takes a deep inspiration (fig. 55). The vocal cords appear as two ivory-like rounded ridges, and if the patient be directed to

* This should be worn between the eyes, as recommended by Dr. George Johnson.

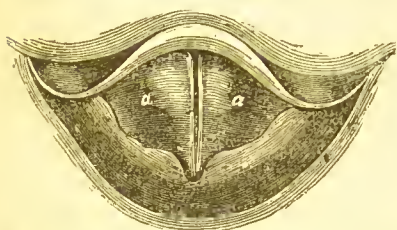
ejaculate "ah!" they are seen to become closely approximated, and then, during inspiration, to become widely divergent. The movements are of a vibratile character, and are very rapidly performed.

When there is much irritability of the fauces, Dr. Johnson recommends the inhalation of a few drops of chloroform. In some nervous subjects two or three sittings may be required before a view of the glottis can be obtained.

CAUSES OF APHONIA.—These may be functional or organic.

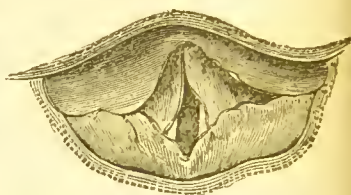
1. *Functional aphonia* is caused by paralysis or excessive debility of the

Fig. 56.



Edema of the glottis, the superior vocal cords *a a*, and the aryteno-epiglottidean folds much swollen, the former almost meeting over the true vocal cords.

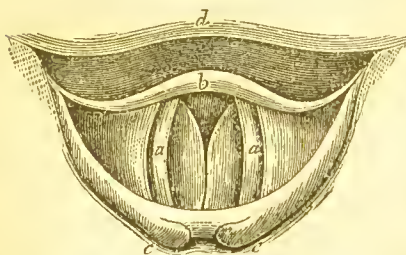
Fig. 57.



Partial destruction of the epiglottis (syphilitic), and considerable swelling of false vocal cords. Symptoms, hoarseness degenerating into aphonia. (Dr. Czermak.)

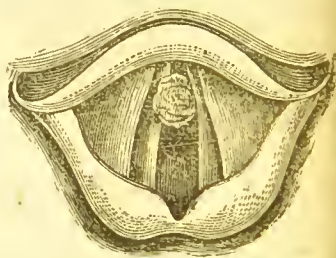
muscles of the larynx, as in cerebral apoplexy and diphtheria, cholera, and other exhausting diseases; hysteria is a common cause of aphonia, but in this disease there is not a loss but a suppression of voice, and the

Fig. 58.



a a, the true vocal cords, below which are seen two sub-glottic swellings, meeting in the centre. *b*, epiglottis, *c c*, arytenoid cartilages. *d*, back of tongue. (Dr. Gibb.)

Fig. 59.



Polypus attached to the right vocal cord, the real cause of a supposed nervous aphonia. (Dr. Czermak.)

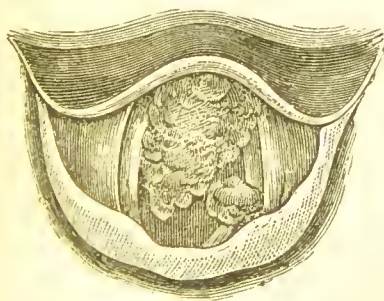
patient may talk in her sleep or be induced to do so under the influence of electricity: severe fright occasionally causes temporary loss of speech. In all cases of functional aphonia the vocal cords are seen with the laryngoscope lying almost parallel, separated by a variable interval, and immoveable.

2. *Organic aphonia*.—The causes of organic aphonia are the follow-

ing:—Laryngitis; œdema; chronic thickening; ulceration; tubercular deposits; cancerous, warty, or cystic tumours, of the vocal cords or arytenoid cartilages; abscesses or other tumours of the contiguous parts projecting between the vocal cords, or pressing upon them. The margin of the glottis is a very favourite seat for the growth of warty excrescences.

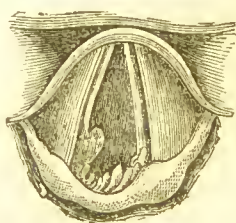
TREATMENT.—Functional aphonia generally will be benefited by electricity, that caused by paralysis of the nerves and muscles more especially so. In cases of excessive debility the general treatment recommended under diphtheria will be required. Strychnia in $\frac{1}{20}$ grain doses twice or thrice a day has proved serviceable in some cases. Astringent and stimulating gargles may be used simultaneously. Hysterical aphonia must be treated as hysteria generally. The treatment of organic aphonia will vary according to its cause. If there be tubercular infiltration, we may apply a leech over the thyroid cartilage occasionally, or direct croton liniment to be rubbed in; the general treatment will be that appropriate for phthisis. If there be follicular enlargement or ulceration, solution of nitrate of silver (gr. v. in f ʒj.) may be applied within the lips of the glottis by means of a camel-hair brush fitted in a handle suitably curved. Granular enlargements and chronic ulcerations may be removed by the repeated application of solid nitrate of silver. Malignant disease may be kept in check by the same means. Small pedunculated tumours may be removed by Dr. Gibbs's laryngeal écraseur. Abscesses may be punctured and œdema relieved by a suitably curved sharp instrument

Fig. 60.



Large epithelial tumour arising from the inferior vocal cord, and occupying the aperture of the glottis. Symptoms, hoarseness, followed by aphonia. (Dr. Czermak.)

Fig. 61.



Syphilitic excrescences on true vocal cords. (Condylomata of the larynx.) Symptoms, severe hoarseness. (Dr. Czermak.)

Acute œdema requires very prompt treatment. When practicable, the œdematous part may be freely pricked here and there with a curved and fine-pointed armed bistoury, so as to induce free bleeding. If this operation cannot safely be performed, strong solution of nitrate of silver may be applied to the larynx and a few leeches to the throat. In xxx tincture of perchloride of iron may be given. If no relief be afforded, and suffocation impend, tracheotomy must be performed.

TRACHEITIS—THE CROUP.

SYNONYM.—Cynanche trachealis.

SYMPTOMS.—The disease generally begins with hoarseness, wheezing, and a dry short cough. Sometimes there is a rattling in the throat during sleep, and the child is often observed to raise the hand to the throat. After a time the breathing becomes difficult, and the breath is drawn in with a sound resembling the passing of air through muslin, or through a metallic tube; and the voice, in speaking and coughing, acquires a shrill and peculiar sound, similar to the crowing of a cock, or to the noise which a fowl makes when caught in the hand. At first the cough is dry; but at length a viscid matter is brought up, and flakes or tubes of false membrane, with efforts often so distressing as to threaten strangulation. The disease is accompanied by the symptoms of inflammatory fever, with hot skin and flushed face, and generally terminates fatally about the second or third day; the lips become blue, the pulse thready, and after much distress the patient becomes drowsy and comatose, and ultimately dies suffocated.

ANATOMICAL CHARACTERS.—Inflammation of the lining membrane of the trachea, and the formation of a false membrane, which, in extreme cases, fills the trachea and bronchi. Large portions of this false membrane, bearing the shape of the tube, have been expelled during fits of coughing and vomiting. The inflammation generally extends upwards to the larynx as well as downwards to the bronchi.

CAUSES.—*Remote and predisposing.* Childhood, between the ages of three and fourteen; low and damp situations, inland, or on the seashore. *Exciting.*—The common causes of inflammation. The disease is sometimes epidemic, and is by some supposed to be contagious.

DIAGNOSIS.—By the peculiarity of breathing, of speaking, and of coughing above described.

From *laryngismus stridulus*.—See that disease.

PROGNOSIS.—*Favourable symptoms.* Early and copious expectoration, the breathing not much impeded, the voice little changed, the febrile symptoms moderate. *Unfavourable.*—Great anxiety and difficulty of breathing, with shrill whistling inspiration; lividity of the face; coldness of the extremities.

TREATMENT.—*Indications.* I. To subdue inflammation. II. To obviate urgent symptoms.

I. The first indication is fulfilled by the free application of leeches to the larynx and trachea. The abstraction of blood should be followed up by a warm bath and tartar-emetic in nauseating doses. The treatment may be commenced by an emetic of from half a grain to a grain of tartar-emetic, according to the age of the child. The bowels should also be freely opened.

Calomel should be combined with the tartar-emetic, so as promptly

to affect the system, and prevent the further effusion of lymph; and as it is important to affect the system as rapidly as possible, mercurial ointment may be rubbed into the thighs or arm-pits. Mercury may be used with the more freedom in children, as the system is with difficulty affected by it.

II. If the symptoms become extremely urgent, the false membranes may sometimes be brought up by the operation of an emetic. When partially discharged by coughing, they should be carefully removed by the hand. If suffocation threaten, tracheotomy must be performed. To be successful, this operation should be performed as early as possible; it often fails on account of the extension of the inflammation to the lower part of the trachea, or even into the bronchial tubes.

In extreme cases, sinapisms or blisters should be applied to the legs. In the case of children, the former should not be left on more than five minutes, nor the latter above three hours.

LARYNGISMUS STRIDULUS—FALSE OR SPASMODIC CROUP.

SYNONYMS. — Crowing inspiration; child-crowing; spasmodic asthma of children; thymic asthma.

SYMPTOMS.—The principal feature of the disease is a remarkable crowing inspiration, unattended by cough, coming on suddenly, and often on first waking from sleep. For a short time the child makes ineffectual efforts to inspire air, and struggles violently, but at length the difficulty is overcome, and the breath is drawn in with a loud crowing sound. If the impediment be less complete, the respiration is hurried and laborious, each inspiration being attended by the peculiar crowing sound; the face becomes livid, the eyes staring and suffused, convulsions supervene, the thumbs are clenched in the hands, the fingers and toes are flexed, and the joints of the wrist and ankle forcibly bent. In extreme cases, death takes place by asphyxia, or the little patient falls, pale and exhausted, into the nurse's lap.

PATHOLOGY.—Irritation reflected through the inferior or recurrent laryngeal nerve upon the muscles of the larynx, in consequence of remote irritation of the gums, stomach, or bowels. A diseased condition of the bronchial and cervical glands, producing irritation of the pneumogastric nerve, or its recurrent laryngeal branches.

CAUSES.—*Predisposing*. Infancy; from birth to the age of three years; the scrofulous diathesis. *Exciting*.—Teething; intestinal irritation; worms; enlargement of the absorbent glands of the neck and chest; cutaneous affections of the scalp and face.

DIAGNOSIS.—From *croup*, by the sudden accession and departure of the fits; by the freedom of the breathing in the intervals; by the absence of febrile or catarrhal symptoms; and, except in rare cases during the fit, of cough. Also, in most cases, by the presence of hot and

swollen gums, glandular enlargements of the neck, and symptoms of intestinal irritation.

PROGNOSIS.—The disease sometimes proves fatal, but more commonly terminates favourably.

TREATMENT.—*During the paroxysm.*—The patient should be placed in a warm bath, the face being exposed to a current of fresh air, and cold water should be dashed over the face and chest. If suffocation be imminent tracheotomy must be performed. *During the intervals.*—The treatment must depend on the existing causes of irritation. If the disease continues when these are removed, change of air, a suitable diet, and attention to the state of the bowels, will generally effect a cure.

Spasmodic diseases of the larynx, with croupy respiration, and convulsive cough or loss of voice, are of frequent occurrence in females, and belong to the long list of anomalous hysterical affections. They must be treated in the same way as other hysterical symptoms.

DISEASES OF THE BRONCHIAL TUBES AND AIR-CELLS.

CATARRHUS	Catarrh.
CATARRHUS EPIDEMICUS . .	Influenza.
BRONCHITIS	Bronchitis.
ASTHMA	Asthma.
EMPHYSEMA	Emphysema.
PERTUSSIS	Whooping-cough.

CATARRHUS—CATARRH.

Acute catarrh, commonly called “a cold,” is a febrile affection, complicated with inflammation of one or other of the mucous membranes. If confined to the mucous membrane of the eyes and nostrils, it is called *coryza*, or *a cold in the head*; if it extend to the bronchial tubes, it is termed *bronchitis*; if it attack the mucous membrane of the bladder, it becomes a *catarrhus vesicæ*. Sometimes the inflammation, instead of attacking the mucous membrane of the air-passages, affects that of the alimentary canal, and is attended with sickness and diarrhœa, or with both together, assuming the form of gastritis, enteritis, or gastro-enteritis mucosa. Its essential characters, therefore, are an increased secretion of mucus from the nose, fauces, bronchi, intestinal canal, or bladder, attended with pyrexia.

SYMPTOMS.—Slight rigors followed by pyrexia; weight and pain in the head; oppression of the chest, and impeded respiration; sense of fulness and stopping up of the nose; repeated sneezing; watery inflamed eyes; cold shiverings, succeeded by transient flushes of heat; soreness of the fauces and tonsils; herpetic eruptions on the lips; cough; pains about the chest; rheumatic pains in the back, neck, and

head. After an interval of time, increased secretion of mucus from the mucous membrane of the nose, fauces, bronchi, &c. When the disease assumes the chronic form, the symptoms are those of inflammation of the mucous membrane originally or principally affected. As this is most frequently the mucous membrane of the air-passages, "catarrhus" and "bronchitis" are often used as synonymous terms.

DIAGNOSIS.—Catarrh is often distinguished from diseases commencing in the same way by the appearance of an herpetic eruption on the lips.

CAUSES.—Cold, or wet and cold, applied to the body. Contagion?

PROGNOSIS.—It is seldom attended with immediate danger, but often lays the foundation for serious diseases.

TREATMENT.—*Indication.* To reduce the existing fever and allay irritation.

In the majority of cases the best treatment of a cold is by ten grains of Dover's powder given over night, followed by the warm bath, or warm water to the feet, a basin of warm gruel, and a hot bed. By these means a profuse perspiration is excited, which effectually removes the febrile action. The Dover's powder may be followed up next morning by a saline aperient. A drachm of spiritus chloroformi may be substituted for Dover's powder. A large draught of cold water, taken at bed-time, will often effectually remove a common cold. If the fever run high, the best remedy is tartarized antimony in nauseating doses and at short intervals, with cooling drinks and saline purgatives.

If there be much smarting and running at the eyes, relief may be obtained by holding the head over the steam of hot water, or bathing the eyes repeatedly with warm water. For the remedies appropriate to the other inflammations, see the diseases themselves.

CATARRHUS EPIDEMICUS—INFLUENZA.

SYNONYMS.—Epidemic cough. La grippe.

SYMPTOMS.—Those of a common cold in their most marked form, with a sudden and extreme prostration of strength, loss of energy, and depression of spirits. The febrile symptoms, which generally assume a remittent type, do not run high, nor is the pulse much increased in frequency. Sometimes the catarrhal symptoms are very slight, the disease being characterised by extreme debility without accompanying local symptoms.

TERMINATIONS AND COMPLICATIONS.—Pneumonia is a very common complication. Bronchitis is also a frequent, and pleurisy an occasional, occurrence. Cynanche tonsillaris; inflammation of the brain or its membranes; muscular and articular rheumatism; diarrhoea and dysentery; erysipelas; continued fever.

CAUSES.—*Predisposing*. The male sex; adult and especially old age; a former attack; low, damp situations. *Exciting*.—A peculiar condition of the atmosphere.

Laws of the Epidemic.—The influenza has been epidemic in the years 1510 and 1557; in 1729, 1733, 1743, 1762, 1775, and 1782; in 1830, 1837, 1841, 1844, 1847, and 1851. It seems to have originated in the East, and after an uncertain period to have shown itself in the north of Europe, whence it has spread westward till it reached England; and from England has passed in a south-easterly direction to France, Spain, and Italy, and across the Atlantic to America. Its course is very similar to that of the Asiatic Cholera, of which it has more than once proved the precursor. Australia has been visited in recent epidemics. The disease, in every epidemic, has attacked a very large proportion (estimated at three-fourths, four-fifths, and nine-tenths) of the population, and is believed to have attacked the domestic animals. The mortality occasioned by it is considerable. In a million inhabitants of the metropolis the registered deaths from influenza were 65 in 1844, 117 in 1841, 150 in 1851, 295 in 1848, and 572 in 1847. In this last year the total deaths in the metropolis from this cause were 1253. Its latent period is believed to be from a few hours to two or three weeks. It commonly remains in the same district or country from a month to six weeks.

DIAGNOSIS.—From *common catarrh*, by its greater prevalence, the suddenness of its attack, the extreme debility which attends and follows it, and by its occurring indifferently at all seasons of the year, and in all states of the atmosphere. From *common ephemeral fever*, by the extreme prostration, and, in many cases, by the herpetic eruption on the lips.

In the epidemic of 1844-45, several cases of influenza assumed a well-marked remittent character, with exacerbations on alternate days, and the herpetic eruption on the lips. (G.)

PROGNOSIS.—Rarely fatal to the young and robust, unless it be complicated with very severe local affections; dangerous to the aged, to the feeble, and the intemperate, and to persons subject to asthma and consumption.

TREATMENT.—In mild cases, that of catarrh; in severe ones, and in aged persons, stimulants, combined with opiates (R. Ammoniæ carbonatis gr. v. Tinct. opii ℥v. Aquæ camphoræ f ʒi., ter die), with a nourishing diet, and liberal use of wine, and local treatment appropriate to the existing complication. Blood-letting is contra-indicated, except in very rare cases. For the treatment of local complications, see the several diseases themselves; but bearing in mind the adynamic character which they assume in influenza. Change of air is among the best remedies, and should be prescribed as soon as the severe symptoms have passed away.

BRONCHITIS.

VARIETIES.—1. Acute; 2. Chronic; 3. Plastic (Bronchial Polypi).

1. ACUTE BRONCHITIS.

SYMPTOMS.—Bronchitis often supervenes upon severe catarrh, the inflammatory affection of the mucous membranes spreading from the upper part of the respiratory tract down into the lungs. The *general symptoms* will be severe in proportion as the mucous inflammation extends towards the air lobules, which may themselves become involved in it. The skin is hot and dry, the pulse full and rapid; there is more or less urgent dyspnoea with wheezing inspiration, and a sense of great oppression referred to the epigastrium. The patient is exhausted by a dry wheezy cough, which often comes on in severe paroxysms; the head is hot and painful, the tongue coated, the urine scanty and high-coloured, and deposits lithates.

After a few days the cough becomes moister, and a clear viscid frothy mucus is expectorated. This gradually loses its adhesiveness and becomes thick and purulent; free expectoration now sets in, affording much relief, the fever and dyspnoea subside, and the cough alone remains. At first it is so frequent that little continuous sleep can be obtained; in a few days the expectoration begins to diminish, the cough subsides, and the patient convalesces. The mucous membrane, however, recovers but slowly, and it often remains in a congested, debilitated condition, and liable, on the least change of temperature, to renewed attacks of inflammation, which ultimately becomes chronic.

When the inflammation spreads into the vesicular structure, and becomes diffused through both lungs, the symptoms are very urgent, the dyspnoea is extreme, the face dusky and anxious.

The *local signs* of the disease are distinct and characteristic. The sitting posture is chosen to allow of the free expansion of the chest, the arms and head are firmly fixed to give effect to the action of the extraordinary muscles of inspiration which are now in active play; the chest is everywhere resonant; on applying the ear, the air is heard, during inspiration, to traverse the bronchial tubes with a wheezing, wind-sighing, or whistling sound; and, during expiration, to pass back again with a prolonged sonorous rhonchus. These sounds are loudest about the roots of the lungs, *i.e.*, about the middle parts of the chest in front and behind. At the bases, apices, and sides the vesicular murmur may still be heard, but it is feebler than usual, and here and there it is obscured by the coarser morbid sounds, or its place is supplied by crepitation. The rhonchus and sibilus are often so loud and general that the vesicular murmur is nowhere heard.

While the inflammation prevails, the elasticity of the lungs is more or less impaired, and in some severe cases the air is imprisoned in the distended lobules by the inflamed and constricted smaller tubes. In such a condition the dyspnoea is extreme; we hear dry, wheezing, and rhonchial sounds, but the vesicular murmur is absent.

As soon as secretion commences moist sounds are heard. If the inflammation have been diffuse so as to have involved the finer air tubes and the vesicular structure, a fine mucous crepitation is now heard over the whole of the back and sides of the chest. In the larger tubes coarser crepitation or mucous râles, with more or less musical wheezing, are heard. During an attack of acute bronchitis, the ingress of air to an entire lobe of one of the lungs may be suddenly stopped. It is an accident which sometimes happens during a violent fit of coughing; the tenacious mucus brought together from the smaller tubes is drawn backwards into a large bronchus by the forcible inspiration which accompanies the convulsive cough, and becomes so firmly impacted there that subsequent efforts fail to remove it. The symptoms are sudden and extreme dyspnoea, or actual suffocation. No air is heard to enter that part of the lung to which the obstructed bronchial tube leads, but, since it is fully distended with imprisoned air, the corresponding part of the chest retains its natural resonance.

Acute bronchitis often occurs in children; its most severe and urgent form has received the name of suffocative catarrh, and is characterised by a sudden and copious secretion of mucus, extreme and urgent dyspnoea, and fine mucous crepitation in every part of the lungs.

2. CHRONIC BRONCHITIS.

SYMPTOMS.—This disease is the sequel of the acute form. In middle-aged or old persons it returns every winter with increased severity, and reappears for several years in succession; in which case it is called winter cough. When the mucous membrane secretes freely, and the breathing is very difficult, the disease is called humoral asthma. The symptoms of this disease are habitual cough, shortness of breath, and copious mucous expectoration. After repeated attacks of the disease, the pulmonary tissue becomes weakened, and emphysema results, marked by increased dyspnoea, and a peculiar dusky hue of countenance. The sufferings of the patient are often increased by flatulence.

In advanced age there are drowsiness, extreme debility, and coldness of the surface. The patient, growing weaker and weaker, at length expires without suffering, suffocated by the accumulated mucus, which he has no longer strength to expectorate.

Dilatation of the bronchial tubes is a condition which frequently accompanies chronic bronchitis. The symptoms are bronchorrhœa, shortness of breath, unusual resonance of the chest, with tracheal or even amphoric breathing. Gurgling and pectoriloquy may also be heard if the dilatation be considerable. The excessive expectoration leads to wasting of the body.

MORBID ANATOMY.—Swelling and redness of the tracheal and bronchial mucous membrane to a greater or less extent. This redness is observed most commonly at the termination of the trachea, and in the first divisions of the bronchi. The air-passages contain a large quantity of tenacious mucus, or muco-purulent fluid. Portions of the lungs are occasionally found *collapsed*. Collapse may be diffuse or

scattered. Diffused collapse may affect the whole lobe of a lung. When the collapse is complete, the part has the colour and consistence of foetal lung, but sometimes it contains but little blood, and is pale. The scattered form of collapse affects only single lobules or small aggregations of lobules, and usually those situated in the anterior edges of the lungs. The collapsed lobules form little depressions like cicatrices; they are usually of a dark colour. Collapsed lung may be readily inflated, and it is thus distinguished from consolidated lung. The mechanism of collapse is very simple. A plug of mucus is drawn by a forcible inspiration into a bronchial tube; the contraction of that portion of the lung to which the obstructed tube leads, may dislodge the plug sufficiently to allow of the passage of air in expiration; but on inspiration it is again drawn back, and prevents the entrance of air. The plug thus acts as a valve, allowing of the egress, but preventing the ingress of air, until at last the obstructed lung is completely deprived of air and collapsed. The chest being an air-tight cavity, it follows that collapse of one part of the lung must be complemented by corresponding dilatation (emphysema) of another, and thus one morbid condition generates another. *Emphysema* alone is the commonest result of long-standing bronchitis. *Dilatation of the bronchi* is another morbid condition often found in chronic bronchitis; the tubes may be uniformly enlarged for a distance, or they may present spindle-shaped, globular, or saccular dilatations here and there, and the dilated part of the tube may be very thin; but usually its walls are greatly hypertrophied. The dilatation is due to atrophy, or abscess of the lung-tissue in the neighbourhood of the larger bronchi, the dilatation being complementary.

3. PLASTIC BRONCHITIS (BRONCHIAL POLYPI).

SYMPTOMS.—Plastic bronchitis is distinguished by the expectoration of branched fibrinous casts moulded in bronchial tubes of the third or fourth diameter. Sometimes the casts are hollow and shreddy, but more usually they are solid and compact. The disease is always associated with more or less hæmoptysis. It recurs after variable intervals. The physical signs are dulness almost as complete as in pneumonia, and absence of breath- as well as voice-sounds, in the affected portion of the lung, by which the disease is distinguished from pneumonia.

PATHOLOGY.—Croupy, fibrinous exsudations from the mucous membrane, the detachment of which occasionally leads to hæmorrhage and the formation of coagula, which may take the form of the tubes.

PROGNOSIS.—The disease is rarely fatal, but it is very obstinate.

DIAGNOSIS.—Bronchitis occupying the whole of both lungs, occurring in a young adult of either sex, and not speedily yielding to treatment, justifies a suspicion of miliary tubercles. Chronic bronchitis with bronchorrhœa and dilatation of the bronchi may, at first sight, be mistaken for phthisis. The bronchorrhœa accompanying dilated bronchi

may cause emaciation, and give rise to tracheal breathing and pectoriloquy. But the history of the case, the nature of the expectoration, and the other physical signs will furnish decisive evidence of the nature of the disease.

SEQUELÆ.—Emphysema, hypertrophy of the heart, and dropsy.

PROGNOSIS.—Generally favourable in the acute and chronic forms; guarded in bronchitis senilis.

CAUSES.—Exposure to cold, the rheumatic and gouty diatheses, heart and renal diseases. In children, measles and whooping-cough.

TREATMENT.—*Of acute bronchitis.* In very acute attacks, occurring in persons previously in strong health, general bleeding from the arm, followed by tartar-emetic in nauseating doses, may be necessary; blisters, mustard poultices, or the turpentine stupe may be applied to the chest. The general treatment of bronchitis consists in the exhibition of stimulating expectorants, such as a combination of ammonia, squill, and senega. Free sweating and diuresis should be induced by appropriate medicines. When the expectoration is freely established, we may give squill or ipecacuanha in combination with the mineral acids. If the circulation be feeble, we may give a moderate amount of gin or brandy. If hypnotics be required, we must use henbane, stramonium, or conium. Opium should only be given when we want to check the expectoration. It should never be prescribed in the early stages of the acute disease. The plastic form of bronchitis is not very amenable to treatment. In otherwise healthy persons it gradually subsides. *Mxx tincturæ ferri perchloridi*, and the inhalation of the vapour of turpentine, are the remedies most likely to do good. As a prophylaxis, the patient should never remain in a heated atmosphere. In the bronchitis of children, emetics are very serviceable by promoting expectoration.

In the chronic form of bronchitis, the treatment must be nearly the same as in the milder form of the acute disease. The compound squill pill is here an excellent remedy, and it may be advantageously combined with comp. ipecac. powder or the extract of conium. When there is a considerable collection of mucus in the air-tubes, with urgent dyspnœa, an emetic may be given early in the morning, or twice in the week, with the greatest advantage. The chest and body should be kept warm, and the chest itself may be protected by a full-sized emplastrum picis. The balsams, gum resins, and oleo-resins, such as myrrh, benzoin, tolu, ammoniacum, galbanum, copaiba, and turpentine, often do much good.

In old age.—When the debility is extreme, the appropriate remedy is a combination of stimulants and narcotics. One of the best consists of five grains of carbonate of ammonia, with five minims of laudanum in an ounce of camphor water. A nourishing diet and a liberal allowance of wine are also required. When dropsical effusions supervene, diuretics and expectorants must be given in combination with stimulants. Those who are subject to bronchitis

should avoid all unnecessary exposure to cold. This is more especially necessary in the bronchitis of old people. The rooms which they inhabit should, therefore, be kept warm, and as nearly as possible of a uniform temperature night and day; the chest and extremities should be carefully protected from cold. If obliged to leave their rooms during the winter, they should use a respirator, or, what answers nearly as well, a folded handkerchief held before the mouth. In many cases, exposure to cold air gives temporary relief, but the symptoms return with renewed severity when the circulation is restored by the warmth of the room.

ASTHMA.

DEFINITION.—Dyspnœa occurring in paroxysms, with intervals of freedom of respiration.

SPECIES.—1. Humoral asthma. 2. Congestive asthma. 3. Spasmodic asthma. 4. Hay asthma. 5. Hysteric asthma.

1. HUMORAL ASTHMA.

SYNONYMS.—Bronchorrhœa, or bronchial flux.

SYMPTOMS.—The attack is usually preceded by a sensation of fullness at the pit of the stomach, lassitude, depression of spirits, drowsiness, and pain in the head. On the approach of evening a sense of tightness is perceived across the breast, with difficulty of breathing, which continues to increase for some length of time. Both inspiration and expiration are performed slowly, and with a loud wheezing noise, and there is a dry cough. The face is either turgid and livid, or pale and contracted. At length the difficulty of breathing becomes so great that the patient, threatened with immediate suffocation, leaves his bed, paces up and down his room, or stands in a stooping posture; or sits with the body bent forwards, the arms resting on the knees, the shoulders raised, the abdomen contracted, and all the muscles of respiration thrown into violent action; and still finding no relief, seeks at the open window a supply of cold air. These symptoms usually continue till towards the approach of morning, when a copious expectoration of a thin frothy mucus comes on, the breathing becomes less laborious and more full, the patient speaks and coughs with greater ease, and, feeling every way relieved, falls asleep. The dyspnœa and tightness of the chest, with evening exacerbations, remain for some days. In some cases the patients awake suddenly after midnight, in a fit of dyspnœa.

PHYSICAL SIGNS.—Sound on percussion generally good, but in extreme cases dull. Sonorous and sibilant rhonchi at the commencement of the attack, followed by the mucous râle and crepitation. Some degree of wheezing and sibilus usually remains after the attack.

MORBID ANATOMY.—Not constant. The mucons membrane is generally free from disease; but some affection of the heart, particularly of the right side, is not uncommon. Miliary tubercles, and extensive disease of the bronchial glands, have been met with in fatal cases. (See Bronchitis—diagnosis.) Emphysema is a common concomitant of this, as of the other forms of asthma.

CAUSES.—*Predisposing.* Hereditary peculiarity; lax habit of body; long-continued dyspepsia; gout. *Exciting.*—Sudden changes of temperature; disorders of the alimentary canal, especially flatulence; certain effluvia, as of hay or ipecacuanha.

DIAGNOSIS.—From other diseases affecting the respiration, by the distinct paroxysms with intervals of perfect freedom. From congestive and spasmodic asthma by the copious secretion of mucus which terminates the fit.

PROGNOSIS.—*Favourable.* Youth and unimpaired constitution, and the absence of organic disease. *Unfavourable.*—Repeated attacks; old age; debility; organic disease. Asthmatic patients often attain to an advanced age.

TREATMENT.—*Indications.* I. To shorten the paroxysms and relieve urgent symptoms. II. To prevent the recurrence of the fits, by removing the predisposing and exciting causes.

I. The first indication may be fulfilled by an emetic at the onset of the attack, but this is inadmissible where there is great debility. In strong and healthy persons full doses of tartar-emetic, of ipecacuanha, or of the lobelia inflata (from ℥xv. to ʒj. of the ætherial tincture) may be given with great advantage. In the debilitated, stimulants are required, such as strong coffee, ammonia, or æther. These may be combined with opium in moderate doses. Heat applied to the extremities, or to the entire surface, by means of the warm or vapour bath, is extremely serviceable, but should be applied at the onset of the attack. When the fit has already lasted some time, and the expectoration is abundant, provided that there be no severe or dangerous symptoms, it is best to leave the patient to himself, as the increased secretion is the best relief to the breathing.

II. The exciting causes must be carefully avoided, the general health improved, and the state of the digestive organs carefully attended to. The bowels should be kept free, but hypercatharsis must be avoided; liquids should be taken in moderation; the diet should consist of a due mixture of animal and vegetable food, but acescent fruits and such vegetables as occasion flatulence should be avoided. The internal remedies will vary with the state of the system. Astringent tonics are serviceable in most cases.

I have found alum, in combination with ginger, very serviceable in removing the distressing flatulence which often precedes and accompanies the fit. Ten grains of the one, with five grains of the other, and three or four grains of rhubarb, may be given three or four times a-day.

I have also more than once met with tenderness on pressure in the cervical and dorsal regions, and have used tartar-emetic ointment with much benefit. (G.)

2. CONGESTIVE ASTHMA.

SYNONYMS.—Dry catarrh.

This resembles the foregoing variety by coming on in paroxysms of severe dyspnoea, but differs from it in the scanty expectoration which accompanies the cough, and terminates the fit. The sputa are small in quantity, highly adhesive, filled with air-bubbles, and speckled with round black or grey spots, and, at the height of the fit, often tinged with blood. After a time the sputa become more abundant and less tenacious, and the fit passes off with increased expectoration.

PHYSICAL SIGNS.—Those belonging to a swollen state of the mucous membrane of the air-tubes—viz., clear sound on percussion, indistinct respiratory murmur, with sibilant rhonchi, or a peculiar click, and, in limited portions of the chest, the mucous crepitation.

MORBID ANATOMY.—A deep red or violet colour of the mucous membrane of the air-tubes, with scanty mucous secretion.

CAUSES.—The same as in humoral asthma. Valvular disease of the heart.

PROGNOSIS.—Generally favourable, except where the disease is of long standing, or complicated with other functional or organic derangements.

TREATMENT.—Nauseating expectorants, as tartar-emetic, squills, ipecacuanha, and the lobelia inflata, are indicated in this form of the disease, together with the inhalation of steam holding some stimulant in solution, such as tar-vapour, or ammonia. Dry cupping and counter-irritation to the chest may be practised with advantage; and colchicum in combination with alkalis has been recommended. Smoking stramonium is sometimes found advantageous, as in spasmodic asthma. Strict attention must be paid to the state of the digestive organs; the bowels must be kept free by aloetic purgatives, and the general health must be carefully attended to.

3. SPASMODIC ASTHMA.

This term is applied to dyspnoea occurring in paroxysms, unaccompanied by signs of congestion or inflammation of the bronchial tubes, and presumed to depend on a spasmodic action of the muscular fibres of the air-tubes.

SYMPTOMS.—Those of humoral asthma; but that the fit comes on more suddenly, and terminates without expectoration.

PHYSICAL SIGNS.—Sound on percussion less clear than usual, respiratory murmur very faint, and occasionally accompanied with slight wheezing or whistling. If the patient be desired to hold his breath for a few seconds, or to count until the air in the chest is exhausted, and

then to inspire slowly and steadily, the air will be heard to enter as usual. (Williams.) The respiratory murmur soon becomes feeble again.

CAUSES.—*Predisposing*. The same as in other spasmodic diseases; hereditary peculiarity; hysteria. *Exciting*.—Attacks of dyspepsia; extreme flatulence; irritation of the upper part of the spinal cord; pressure of tumours on the pulmonary plexus or on the par vagum.

PROGNOSIS.—Favourable, in the absence of complications: dangerous when combined with other diseases of the lungs, or with those of the heart. It often causes pulmonary congestion, and hæmorrhage, and lays the foundation of emphysema, and of dilatation and hypertrophy of the heart.

TREATMENT.—*Indications*. I. To relieve the patient's sufferings during the fit. II. To improve the general health, and give tone to the system during the intervals.

I. When the fit has actually commenced, some relief may be afforded by counter-irritants to the chest, epigastrium, and extremities; by antispasmodics, as opium, æther, chloroform, belladonna, assafoetida, and valerian. Opium and æther in combination (tr. opii. ℞xx. to ʒss, and æther ʒss. to ʒi.) is a useful remedy in the fit. Strong coffee has been strongly recommended by Pringle and Laennec. When the patient is aware of the approach of a fit, he may sometimes ward it off by an emetic, or by smoking stramonium or tobacco. Dashing cold water over the face and body will often succeed in preventing a paroxysm. Electricity has been used with the same view. The ascertained causes of the fit must of course be carefully avoided.

II. The state of the digestive organs demands particular attention: the diet should be light, wholesome, and easy of digestion; and all substances which encourage flatulence should be avoided. The state of the bowels must be carefully attended to. For the improvement of the general health, the shower-bath, or cold sponging, followed by frictions of the chest, should be employed every morning, and tonics should be administered in full doses. Where much flatulence is present, alum in combination with ginger may be given with advantage. If there be tenderness in any part of the spine, leeches may be applied, or the tartar-emetic ointment, or both.

When the spasm of the bronchial tubes is combined with congestion of the mucous membrane, or with increased secretion, the treatment must be varied accordingly. Depletion or counter-irritation must be employed with antispasmodic remedies. The same strict attention to the diet, to the state of the bowels, and to the general health, will be required in every form of asthma.

4. HAY ASTHMA.

SYNONYM.—Hay Fever.

SYMPTOMS.—Those of humoral asthma, with the addition of marked symptoms of catarrh.

CAUSES.—*Predisposing*. Peculiarity of constitution. *Exciting*.—

The odour of hay, or that of a stable. In some cases fine powders floating in the air, especially powdered ipecacuanha.

TREATMENT.—That of humoral asthma during the paroxysm. In the interval, the careful avoidance of the exciting cause.

5. HYSTERIC ASTHMA.

SYMPTOMS.—This disease has its seat in the external muscles, and is closely allied to chorea and hysteria. It is characterised solely by extraordinary frequency of the respiration, with perfectly healthy sound of the chest and breathing. It is sometimes also a marked symptom of paralysis agitans, the muscles of respiration partaking of the affection of the other muscles. A frequent pulse, due to the hurried state of the respiration, is also a symptom of this disease.

A remarkable case of spasmodic asthma occurred in a female aged twenty-two, who came under my notice several years back as a patient of the Surrey Dispensary. The paroxysms, which were of variable duration, were characterised by extreme frequency of breathing, with comparatively little general disturbance of health, and perfect freedom of respiration. There was amenorrhœa, some tenderness of the upper part of the spine, and constipation. The disease was cured by purgatives judiciously and perseveringly administered. No other remedy was employed. Hypercatharsis was invariably followed by a paroxysm. I have seen a case of the same kind in which there were 140 respirations to 144 pulses. In this case much benefit was derived from cold affusion. (G.)

EMPHYSEMA.

SYMPTOMS.—Permanent shortness of breath, increased to extreme dyspnoea by occasional exciting causes, such as exercise, flatulence, or a common cold; and in extreme cases, by assuming the horizontal posture; with a dusky hue of countenance and cold extremities. Fits of orthopnoea, with violent palpitation and blueness of the face and lips, come on suddenly in the night, obliging the patient to sit up, and to open the doors and windows of his room for air. The dyspnoea is attended by cough, with scanty expectoration, which varies in character, consisting in most cases of a thin mucus, mixed with small tenacious clots, and filled with air-bubbles. The expectoration is often increased by a supervening attack of bronchitis; and it becomes abundant towards the end of the fit. The general aspect of the body undergoes a change by the long continuance of the malady; the countenance becomes pale, and of a dusky hue, the body is emaciated, and the legs and abdomen swell.

PHYSICAL SIGNS.—Peenuliarly clear sound on percussion, extending lower than usual; indistinct respiratory murmur, and prolonged inspiratory and expiratory sounds; to which is sometimes added, a dry crepitation, with occasional loud clicking sound, or a friction sound, similar to that of a finger rubbed on a table. The respiratory movements are in-

distinct, and the respiration is abdominal. The impulse of the heart is best felt in the epigastrium; the natural præcordial dulness has disappeared. In marked cases, the chest is enlarged and bulged in all directions; but when the emphysema is confined to one lung, or to a part of one lung, the chest is irregularly enlarged. When complicated with bronchitis or other diseases of the lungs, the physical signs of those diseases are superadded.

MORBID ANATOMY.—Distension of the lungs; the anterior margins almost meet and conceal the pericardium; the heart and diaphragm are depressed; usually there are extensive old adhesions between the pleuræ, and the cartilaginous ribs are ossified. The lungs are pale, dry, and bloodless, and have a soft woolly feel. The cells are enlarged; the distended lobules are often ruptured and communicate with each other, forming little bladders of air which collapse on the lightest touch of the scalpel. These bladders of air are usually found around the thin anterior margins of the lungs. Hypertrophy with dilatation of the right side of the heart. Congestion of the venous system.

SEQUELÆ.—The permanently distended condition of the air-cells, opposing as it does the entrance of a proper quantity of blood into the lungs, ultimately produces hypertrophy of the right side of the heart. Fatty degeneration of the liver and kidneys. Anasarca and ascites.

DIAGNOSIS.—From asthma, by the permanent shortness of breath. But as emphysema is a common occurrence in chronic bronchitis, and is apt to supervene after repeated attacks of all the forms of asthma, this diagnostic mark does not admit of very frequent application.

CAUSES.—Repeated attacks of bronchitis, which impair the contractility and elasticity of the air-cells. Pleuritic adhesions, which prevent the collapse of the lungs. Old age, leading to degeneracy of the lung tissue.

PROGNOSIS.—The disease is rarely fatal in itself, but it ultimately leads to pulmouary dropsy.

TREATMENT.—I. During the paroxysms. II. During the intervals.

I. *During the paroxysms.*—The fits may be greatly relieved by a combination of opium and diffusible stimulants. From ℥ xx. to ʒss. of laudanum, with from half a drachm to a drachm of æther, may be administered at the onset of the fit. The shoulders should be well raised, the doors and windows should be thrown open, at the same time that the body, and especially the lower extremities, are kept warm. In extreme cases, cupping between the shoulders, or the cautious abstraction of blood from the arm by a small orifice, may become necessary. When the patient has reason to apprehend an attack, an emetic, by emptying the stomach, and removing the existing flatulence, may prevent the paroxysm; and similar relief is sometimes afforded by promoting a free action of the bowels. Five grains of calomel and five grains of extract of colocynth, followed by a black draught, is a suitable purgative.

II. *During the intervals.*—This disease does not admit of cure. The treatment is partly that of the complications which may exist with it, and partly consists in a few simple precautions, such as the avoidance of colds by warm clothing and dry feet, the daily use of cold sponging or the shower-bath, regular and moderate meals, aloetic aperients, liquids in small quantity, and the avoidance of the causes of flatulence. If flatulence exist, a combination of $\text{x grs. alum, iii of rhubarb and v of ginger}$, taken twice or thrice a day; or a pill containing the same or similar ingredients, taken daily an hour before dinner.

Emphysematous patients suffer most in close moist weather, when the function of the skin is impeded; and least when the weather is open and the air dry and bracing.

PERTUSSIS—WHOOPIG-COUGH.

SYNONYMS.—Tussis convulsiva, chin-cough, kinkhost.

DEFINITION.—A contagious and infectious malady, characterised by a peculiar cough occurring in paroxysms terminated by vomiting.

SYMPTOMS.—The disease generally sets in with the symptoms of a common cold, and it is not till the lapse of two or three weeks, or, in rare cases, of as many months, and when the febrile symptoms have somewhat abated, that the peculiar and characteristic symptoms show themselves. The cough now comes on in distinct fits; each fit consisting in a series of violent and convulsive expirations with congestion of the face, and threatening of instant suffocation, and sometimes with involuntary discharge of the urine and fæces, followed by a sudden long-drawn inspiration, accompanied by a peculiar whoop from which the disease has obtained its name. The convulsive coughing is renewed, and continues in the same manner as before, till a quantity of mucus is thrown up from the lungs, or issues from the mouth and nostrils mixed with blood, or till the contents of the stomach are evacuated by vomiting. After the fit the patient has usually an interval of perfect freedom from cough, and often expresses a desire for food; but when the attack has been severe, it is succeeded by much fatigue, hurried respiration, and general languor and debility. Children evince great fear of the fits, and will run to their nurses or mothers for relief. Adults are seized very suddenly, and the paroxysms are usually very severe. The disease generally attains its greatest severity at the end of the fourth or fifth week, after which the paroxysms become less severe, and at length, after a further variable period of from two weeks to four months, entirely cease. In some instances, however, the disease has been protracted for several months, and even for more than a year.

SEQUELÆ AND COMPLICATIONS.—Bronchitis, with collapse of the lung: Pneumonia: Pleuritis: Gastritis: Phrenitis: Convulsions: Apoplexy: Epilepsy.

MORBID ANATOMY.—The sign of inflammation in the bronchial tubes,

with large collection of mucus in the air-passages. Collapse, diffused or scattered, with complementary emphysema. Inflammation of the substance of the lungs. Inflamed bronchial glands. Inflammation of the mucous membrane of the stomach, and of the intestines, with enlargement of Peyer's and Brunner's glands. In other words, an inflamed condition of the parts supplied by the eighth pair of nerves, which have themselves been observed to be red.

CAUSES.—*Predisposing.* The period of childhood. Adults, however, are not exempt; and the disease even attacks persons of seventy and eighty years of age. The seasons of spring and autumn. *Exciting.*—A specific poison acting upon the eighth pair of nerves. (Todd.)

DIAGNOSIS.—In the early stage it is known by the abundant sputa, the occasional vomiting, the violence of the paroxysms, and the perfect freedom in the intervals. When fully established, it is distinguished by the convulsive cough, followed by the peculiar whoop above described; and by the fits terminating in vomiting, bleeding from the nose, or free expectoration. In adults it is known by the sudden seizures above described.

PROGNOSIS.—*Favourable.* Moderate and free expectoration; the strength little impaired; the fits neither frequent nor violent; in the interval, the respiration free; the appetite good; the absence of fever; moderate hæmorrhage from the nose. *Unfavourable.*—The disease occurring in children under two years of age, and especially while suckling or teething; and in children born of phthisical or asthmatic parents. Complication with any of the diseases above mentioned.

LAWS OF INFECTION.—Propagated by contagion, by fomites, and through the air. Rarely attacks the same person twice. May coexist with small-pox, measles, and other febrile disorders; but is sometimes cured on their appearance. The infecting distance is believed to be considerable. Latent period, five or six days.

MORTALITY.—The deaths in the metropolis during 15 years, in a million persons of all ages, fluctuated between 582 and 1,217, the average being 857. Two diseases only (Typhus Fever and Scarlatina) are more fatal to life.

TREATMENT.—*Indications.* I. To induce a state of nausea, so that the fit may be more promptly finished by vomiting. II. To reduce the inflammatory irritability of the respiratory passages.

1. These two indications may be perfectly fulfilled in a large majority of cases by the same remedy—viz., tartarized antimony in doses sufficiently large to keep up a constant state of nausea. From a twelfth to a sixth of a grain, according to the age of the patient, may be given at short intervals, either alone, or in combination with a grain of hydrargyrum c̄ cretâ. The bowels must, at the same time, be kept free by gentle aperients, the diet must consist of bland farinaceous substances, and the patient must be carefully guarded from cold, and

kept in a pure warm air." When there is extreme restlessness, and the fits are accompanied by great distress, the tartar-emetic may be combined with opium, or the antimonial wine with laudanum. Half an ounce of antimonial wine with a drachm of laudanum, and distilled water in sufficient quantity to make a mixture of ζ iss, will form a very good combination. The dose, for a child of ten years old, may be a tea-spoonful twice or thrice daily. When the mucus is brought up with difficulty, an emetic should be given once, twice, or thrice a week. A warm bath may be given occasionally with advantage.

2. If there be signs of inflammation in the lungs, one or more leeches may be applied over the upper part of the sternum, followed, if necessary, by bread and mustard poultices, stimulating embrocations, or even blisters to the chest. If there be determination of blood to the head, leeches to the temples and cold applications. If the child be too weak to bear antimony, we must employ ipecacuanha or squills in combination with spirit of chloroform and belladonna. Expectorants in combination with mineral acids often do much good. When the severity of the disease has passed away, change of air is the best restorative. This remedy is also sometimes of the greatest service in the very height of the disorder. Existing debility must be treated by tonics, of which the best are the preparations of steel.

REMEDIES.—*Sedatives*, such as tincture or extract of hyoscyamus, or conium, syrup of poppies, extract of lettuce, or prussic acid, belladonna, digitalis. *Antispasmodics*, such as musk, garlic, assafoetida, and camphor; cochineal, oil of amber, cantharides, cinchona bark. *Alteratives*, such as arsenic, sulphate of zinc, alum, bromide of potassium. *Counter-irritants*. To most of these remedies the following observations of Dr. Bateman may be applied:—"Perhaps there is no disease for which so many *specifics* and infallible nostrums are promulgated with confidence, or so few actual remedies known."

DISEASES OF THE SUBSTANCES OF THE LUNGS.

PNEUMONIA , . . .	Inflammation of the Lungs.
GANGRENA PULMONUM .	Gangrene of the Lungs.
HÆMOPTYSIS . . .	Spitting of Blood.
PHTHISIS PULMONALIS .	Pulmonary Consumption.

PNEUMONIA.—INFLAMMATION OF THE SUBSTANCE OF THE LUNGS.

SYNONYMS.—Peripneumonia. Pulmonitis. Pneumonitis.

SYMPTOMS.—*General*. The disease sometimes sets in with rigors, followed by pyrexia; at others the local symptoms are the first to show themselves. There is high fever, with increased heat of surface, especially on the chest; flushed face; injection of the eyes; headache; frequent, quick, and compressible pulse; thirst, furred tongue; anorexia; and great debility. The symptoms referable to the chest itself are a diffused, dull pain, deep-seated, rarely acute, unless the disease

involve the pleura; a short and dry cough, accompanied at first with scanty mucous expectoration, but after the lapse of one or two days, with a rusty-coloured, very adhesive sputum; the respiration is frequent and short, rising from 13 or 14 (the probable number in the recumbent posture in health) to 30 and upwards.

In favourable cases, the disease may decline on the third or fourth day; more frequently it is protracted to ten days or a fortnight. In unfavourable cases the symptoms increase on the third or fourth day; the respiration becomes more and more frequent; the sputa of a deeper hue, of a more viscid consistence, and often streaked with blood; the pulse increases in frequency and feebleness; the tongue is dry and covered with a brown fur; the skin hot and pungent to the touch; the debility extreme; delirium and coma come on, with all the symptoms of the typhous state. In the last stage, the expectoration loses its viscid character, and becomes a thin reddish-brown fluid; the dyspnoea increases; the pulse is small and fluttering; the countenance pallid; the lips livid; the skin covered with a clammy sweat; there is an increasing rattle in the throat; and at length the patient dies exhausted, asphyxiated, or comatose. Fœtid odour of the breath, and putrid sanious expectoration, announce the occurrence of gangrene. In favourable cases the symptoms gradually subside, and the sputa become less viscid and more abundant, and of a purulent or muco-purulent character.

Local Symptoms.—Dulness over the inflamed lung, unless it lie far from the surface; very fine crepitation; bronchial breathing and broncophony, with increased respiration in the unaffected portions of the lungs. Fine crepitation is the first indication of the congestive stage. It supersedes the vesicular murmur, and continues to be heard for a day or so, and then gradually decreases until it is no longer heard, and it is now that the bronchial breathing and broncophony are most marked. If the inflammation be resolving, a little mucous crepitation begins to be heard, and it soon increases in intensity and extent, until at last it becomes general, the bronchial breathing and broncophony meanwhile decrease and become extinct. The inflamed lung is again permeated by air. The cough is now accompanied by the expectoration of viscid, rusty-coloured sputum. As the inflammation subsides, the moist sounds give place to the natural vesicular murmur, which, in returning, declares that the lung is being restored to its normal condition. Resonance on percussion is of course established *pari passu* with the recovery of the lung. If, however, resolution do not take place, the dulness, tracheal breathing, and broncophony become very marked and persist, and there is complete absence of vocal fremitus. But if the whole of one lung become consolidated, tracheal breathing and broncophony are absent, because no air can be drawn into the hepatized lungs. If portions of the hepatized lung suppurate, and the abscess be discharged, the physical signs of a cavity, viz., pectoriloquy, amphoric breathing, and gurgling (see Phthisis) will be present. The parts most commonly affected are the lower lobes of one or both lungs; and the local symptoms are most strongly marked at the lateral and posterior parts of the chest.

VARIETIES AND COMPLICATIONS.—Pneumonia is a frequent concomitant of the latter stages of infectious fevers, of erysipelas, and pyæmia. Thus associated it is very liable to be overlooked. Great heat of chest, unusual dyspnœa, and sudden aggravation of the symptoms, should lead the practitioner to suspect this complication. The physical signs are the same as in idiopathic pneumonia. It frequently comes on during the deposition of miliary tubercle in the lung, constituting *tubercular pneumonia*. It is also apt to attack patients in the advanced stages of phthisis. It is a frequent concomitant of bronchitis. It is most commonly combined with pleurisy (pleuro-pneumonia).

MORBID ANATOMY.—In the first stage of the disease, *sanguineous congestion*. The lungs are distended and engorged with blood, but they still float in water. In the second they are in a state of *red hepatisation*, and sink in water. Examined with a pocket lens, the broken surface of the solidified lung has a fine granular appearance. The third stage is that of *yellow hepatisation* or *diffused suppuration*. The lung tissue is soft and rotten, and if a depression be made in it with the finger, purulent fluid soon oozes out to fill it.

CAUSES.—*Remote and predisposing.* Sanguineous temperament, vigorous and plethoric habit, winter and spring seasons, a peculiar state of the atmosphere. Great debility and privation in the poorer inhabitants of large towns. *Exciting.*—The common causes of inflammation; vicissitudes of temperature, violent exercise of the body, or exertions of the voice; congestion occurring from common causes, or in the course of various febrile diseases; other affections of the lungs, especially tubercular deposits; diseases of the heart.

DIAGNOSIS.—The adhesive rusty-coloured sputa, the minute crepitation, and the other physical signs, together with the short quick silent breathing, positively distinguish pneumonia. The history of the case will distinguish idiopathic pneumonia from typhus fever with chest complication.

PROGNOSIS.—*Favourable.* An early and copious mucous expectoration, the small crepitation changing to the distinct mucous râle; later in the disease, an abundant muco-purulent expectoration, with return of resonance of chest and respiratory murmur; hæmorrhage from the nose; warm, equable, and free diaphoresis; diarrhœa; inflammation on an external part; a sediment in the urine; diminished frequency of respiration is an extremely favourable symptom; the absence of complication; the disease being of limited extent.—*Unfavourable.* Violent fever and delirium, or typhous symptoms; no expectoration, or the expectorated matter tinged with blood, or of a dark or black colour; sudden cessation of pain, followed by a change of countenance, and a sinking or irregularity of the pulse; increasing frequency of respiration; a previously-broken constitution; the disease extending to the whole lung or to both lungs; occurring in very young children, or in the aged or debilitated.

TREATMENT.—This must vary with the stage of the disease. *During the first stage*, or that of congestion, and in plethoric and vigorous subjects, blood may be taken from the arm, the bleeding to be followed by a brisk aperient, and by tartarized antimony, in half-grain doses, at intervals of one or two hours. The quantity may be increased to a grain, or even more, and it may be advantageously combined with calomel. Half a grain of tartar-emetic, with two of calomel, may be given every one or two hours, and mercurial ointment should meanwhile be rubbed into the armpits and groins until the gums are affected. This treatment, proportioned to the age, may also be employed in the pneumonia of infants. In less vigorous subjects, local depletion by leeches or cupping will suffice, and in weakly persons, counter-irritants, without general or local abstraction of blood. As a general rule, bleeding is contra-indicated in the inhabitants of large towns, and still more in persons addicted to intemperance. In such persons a stimulant plan may be advantageously adopted from the first. (A table-spoonful of the liq. ammoniæ acetatis every three or four hours.)

In the second stage, or that of hepatisation, local bleeding, by cupping or leeches, followed by a strong blister, will be required, and calomel and opium should be given frequently, so as to affect the gums. If, however, there be high fever, the tartar-emetic may still be continued in combination with the calomel; but if typhous symptoms have already supervened, stimulants are called for; such as ammonia and brandy.

In the third stage, or that of suppuration or gangrene, stimulants, such as ammonia, æther, and wine, must be freely given. Quinine and the mineral acids are the appropriate remedies for this condition.

The foregoing remedies must be employed with due regard to the severity of the local disease, as well as of the general symptoms. When bleeding is employed, its effects should be carefully watched. Debility, in the absence of marked typhous symptoms, does not counter-indicate it; and if the pulse rise under its use, it may be continued with advantage. The diet must be strictly antiphlogistic in the first stage; nourishing and stimulant if typhous symptoms supervene; nourishing, but not stimulating, during convalescence. The patient's room should be of a moderate and equable temperature (about 60°); the head should be raised as much as the patient's strength will allow, and the posture should be changed from time to time.

If a chronic form of pneumonia continue after the severe symptoms have been removed, a course of mercury so as slightly to affect the system, counter-irritation, the iodide of potassium with decoction of bark, with change of air, regular exercise, and temperate diet, may be resorted to. The patient requires to be closely watched, and the chest should be examined from time to time.

GANGRÆNA PULMONUM—GANGRENE OF THE LUNGS.

VARIETIES.—1. Diffused. 2. Circumscribed.

SYMPTOMS.—Extreme prostration of strength; a frequent, feeble pulse; expectoration of dingy-green sputa, mixed with blood, and of a peculiarly offensive odour; mucous râles and gurgling; marked typhous symptoms; and death from exhaustion.

CAUSES.—Pneumonia occurring in extremely feeble constitutions. Pulmonary apoplexy occasioned by pressure on the pulmonary veins. (See a Clinical Lecture by Dr. Todd in *Med. Times and Gazette*, Jan. 13, 1855.)

DIAGNOSIS.—The pre-existence of inflammation, and the peculiar colour and offensive odour of the sputa.

PROGNOSIS.—Highly unfavourable, especially when the disease involves a large portion of the lungs. About an eighth of the cases terminate favourably.

TREATMENT.—Strong stimulants and opium in full doses. (℞. Ammon. carb. gr. x. Tinct. Opii ℥ xx. or ℥ xxx.) This may be given, in camphor mixture, every three or four hours, the effect of the opium being carefully watched, with a liberal allowance of wine or spirits, and a nutritious diet. The chlorine gargle and mixture as recommended in Scarlatina. Chlorine inhalations.

HÆMOPTYSIS—SPITTING OF BLOOD.

SYMPTOMS.—*General.* Spitting of blood is often preceded by a sense of weight and oppression in the chest, or of uneasiness in some one spot, with slight febrile symptoms, a frequent, sharp, and compressible pulse, some difficulty of breathing, and a dry tickling cough. In some cases the mouth constantly fills with blood, without cough or irritation of the throat; but in other cases the blood is brought up alone, or mixed with mucus, after long fits of coughing. The patient usually complains of a salt taste in the mouth.

Local.—Sometimes the chest affords the natural sound on percussion, and there is slight mucous râle; at other times there is dulness on percussion over a limited spot, surrounded by fine crepitation. In the former case, the hæmorrhage is from the bronchial tubes (bronchial hæmorrhage); in the latter, blood is effused into the substance of the lungs (pulmonary apoplexy). In a third class of cases the spitting of blood occurs as a symptom of confirmed phthisis, and the stethoscopic signs are those of a cavity in the lungs.

CAUSES.—*Predisposing.* A certain age—from the period of puberty to the forty-fifth year; sanguineous temperament; plethora; narrow conformation of the chest; previous attacks of the same disease.

Exciting.—Excessive heat of the atmosphere ; violent exercise ; the lifting of heavy weights ; inordinate exertion of the organs of respiration, as in public speaking, singing, &c. ; external violence.

The most common cause of hæmoptysis is the existence of tubercular deposit in the lungs, the hæmoptysis in some cases preceding, in others following, the appearance of the other symptoms of pulmonary consumption. The next in point of frequency is vicarious hæmoptysis, the consequence of amenorrhœa. Less frequent still is hæmoptysis dependent on disease of the heart, or rupture of an aneurism. Least frequent of all is hæmorrhage, caused by plastic bronchitis. Hæmoptysis may occur in congestion of the lungs, however produced, as in pneumonia ; in the fit of congestive asthma ; in gangrene of the lungs ; and with hæmorrhage from other organs, in purpura hæmorrhagica, and purpura nautica.

DIAGNOSIS.—The blood is brought up by coughing, generally in small quantities, or mouthfuls at a time, of a florid red colour, and preceded by, or mixed with, a little frothy mucus. An abundant sudden discharge of *florid* blood would alone lead us to regard the hæmorrhage as coming directly from the lungs, being poured out either by its own vessels, or in consequence of the rupture of an artery communicating with the air-passages.

From *hæmatemesis*.—The blood thrown up in hæmatemesis is usually in much larger quantity, of a darker colour, more grumous, mixed with food, and usually unattended with cough. From *hæmorrhage from the nose, fauces, or gums*.—By the negative result of a careful examination of those parts, and the history of the case.

PROGNOSIS.—As regards the disease itself, the prognosis is generally favourable, when the hæmorrhage is not in very large quantity, and suddenly poured out. But, even in this latter form, temporary recoveries are frequent. It is also favourable when taking the place of the menses in amenorrhœa. In most other cases in both sexes its occurrence must excite suspicion of the existence of tubercles : in the ascertained absence of tubercles, there would be reason to fear disease of the heart. When the hæmoptysis is preceded or followed by the expectoration of solid exsudations from the bronchial tubes, the prognosis is also favourable.

TREATMENT.—*Indications*. I. To remove congestion where that exists. II. To keep the circulation quiet. III. To restore the relaxed vessels to their healthy condition.

I. The first indication is best fulfilled by bleeding from the arm. The circumstances which justify the adoption of this remedy are plethora, a full, frequent, and jerking pulse, great dyspnoea, a flushed countenance, and abundant hæmorrhage. When the countenance and skin are pale, the pulse small and weak, and the respiration little affected, bleeding is not required. Bleeding is also contraindicated when hæmoptysis occurs in the course of an attack of phthisis. Leeches or cupping may be substituted for general bleeding when the abstraction of blood is less urgently required.

II. Low diet, perfect repose, fresh cool air, cold liquids, or ice held in the mouth, with gentle aperients, will fulfil the second indication. The head of the patient should be raised, and he should be forbidden to speak, except in a whisper, and then as little as possible. If after bleeding there be still some febrile action, tartar-emetic, in doses of one-eighth to one-fourth of a grain, may be given every three or four hours.

III. After existing congestion or febrile symptoms have been removed, or in cases where there has been from the first no congestion or fever, the third indication will be fulfilled by remedies belonging to the class of astringents, such as dilute sulphuric acid, in doses of twenty drops, or the acetate of lead, in doses of from five or six to fifteen grains daily, given with an excess of acetic acid, and combined with tincture of opium or hyoscyamus, and tincture of digitalis. Twenty drops of dilute sulphuric acid, with five of laudanum and ten of digitalis, three or four times a day, may be given with advantage; or the acetate of lead, and acetic acid, may be substituted for the dilute sulphuric acid. Five grains of gallic acid given every three or four hours is a serviceable remedy.

PHTHISIS PULMONALIS—PULMONARY CONSUMPTION.

DEFINITION.—Tubercular deposit in the lungs, giving rise, in most cases, to suppuration and hectic fever.

SYMPTOMS.—*General.* The disease usually begins with a short dry cough, occurring, for the most part, on first rising in the morning, and so slight as to become habitual before it excites the attention of the patient. It is sometimes accompanied by slight dyspnoea, increased on exertion, and the patient generally loses flesh, is soon fatigued, and easily thrown into a perspiration; or he complains of unusual coldness of the trunk and extremities. Slight dyspeptic symptoms, diarrhoea, frontal headache, and a small, frequent, quick pulse, are also among the early symptoms; and, on inquiry, we shall often learn that the patient has formerly spat blood.

Sometimes these early symptoms are disregarded, but more frequently they are misinterpreted, so that the disease appears to begin suddenly with profuse hamorrhage from the lungs, with pneumonia, or with bronchitis.

When it sets in in either of these ways, it sometimes runs a very rapid course, and destroys life in three or four weeks (*Acute Phthisis*). But in the great majority of cases the disease is chronic; and after the symptoms above described have continued for a variable period of several weeks, months, or even years, in consequence of a cold, or some trivial exciting cause, the cough becomes more constant and troublesome, and is attended by expectoration, at first of a frothy mucus, afterwards of a more viscid and opaque sputum, often

mixed with small round particles of tubercular matter, with pus, or with streaks of blood; or hæmoptysis occurs in a more marked form, and to a greater extent. The dyspnœa increases, there are shooting pains in the chest, or cutaneous tenderness, and a peculiar hoarseuess of the voice is present in many cases.

As the disease advances, the cough and dyspnœa become more urgent, the expectoration more abundant, the emaciation and weakness more considerable, the pulse more frequent; there are chills at noon or in the afternoon; the face flushes towards evening; the palms of the hands and soles of the feet are affected with burning heat; in a word, hectic fever sets in, followed towards morning by profuse perspiration. The urine is high-coloured, and deposits a pink sediment. The tongue, from being white, is now preternaturally clean and red, and the appetite often improves. Profuse diarrhœa, sometimes tinged with blood, colliquative sweats, extreme emaciation, shedding of the hair, œdema of the legs, aphthæ in the mouth and throat, hectic fever in its most marked form, and a very feeble, rapid, and often irregular pulse, usher in the fatal termination. In some cases the patient dies suffocated, having escaped many of the most distressing symptoms. In other instances delirium, and other indications of tubercular meningitis are added to the usual symptoms, for some weeks before the fatal event. The appetite often remains good to the last, and the patient flatters himself with the hopes of speedy recovery, and is often forming distant projects of interest or amusement, when death puts a period to his existence.

Local Symptoms.—In the incipient stage, before suppuration sets in, dulness on percussion over the clavicles and in the supra and infra clavicular regions, on both sides, but generally greater on the right than on the left side. Similar dulness between the scapulæ. The upper part of the chest, in some instances, is obviously contracted, the clavicles being very prominent, the supra-clavicular regions deeply hollowed, the anterior and upper part of the chest flattened, and the shoulders thrust prominently forward. The respiratory movements are diminished. The stethoscopic indications are a roughness in the respiratory murmur; a prolonged expiratory sound; bronchial respiration and broncophony, heard more distinctly on one side than the other, and most to be depended on as a sign of incipient phthisis when heard towards the point of the shoulder; mucous crepitation; a slight click; increased resonance of the voice; in some cases, extremely indistinct respiratory murmur; puerile respiration in the sound parts of the lungs. The heart sounds are peculiarly distinct over all parts of the chest.

In *confirmed* phthisis, one or more of the following physical signs are superadded to the foregoing coarse crepitation:—more distinct click or bubbling sound, which is most distinctly heard when the patient coughs or takes a full inspiration; cavernous rhonchus; cavernous respiration; pectoriloquy; amphoric resonance; metallic tinkling; distinct gurgling when the patient coughs; and, in rare cases, equally distinct sound of fluid in motion on succussion. The cracked-metal sound, on sharp percussion. The situation in which these sounds occur, and the limited

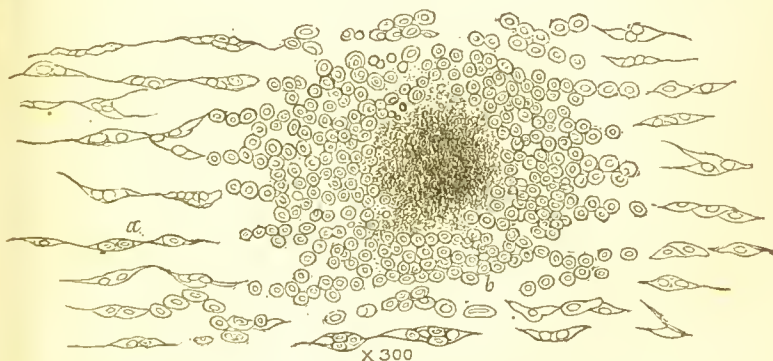
space which they occupy, will generally serve to distinguish phthisis from other conditions of lung productive of the same or similar sounds.

The sputa are at first frothy, as in bronchitis; then mucous, then flocculent, resembling "irregular balls of flock or wool, of a yellow or greenish colour, sinking and breaking down in water;" and lastly purulent, often sinking in water, and sometimes containing particles of clotted matter, like softened cheese. The sputa are often streaked or spotted with blood; sometimes they are discharged in masses which the patient compares to "oysters," and which are also designated as "nummular sputa." In rare instances, distinct portions of pulmonary tissue are spit up, having under the microscope the appearance depicted in Fig. 4, p. 29; and still less frequently there is an expectoration of cretaceous or earthy matter. The frothy and mucous forms of expectoration attend the early stages of phthisis, the flocculent and purulent the more advanced stages.

Hæmoptysis is liable to occur both in the early and in the advanced stages of the disease.

MORBID ANATOMY.—In the lungs, tubercular matter, in the form of miliary tubercles or granulations scattered through the lungs; or of

Fig. 62.



opaque yellowish-white or cheesy masses infiltrated into their texture. Cavities of various size and shape, sometimes found in every part of the lung, but generally confined to the upper lobes, larger and more numerous on the right than on the left side. The liver enlarged, and changed in appearance and consistence (the fatty or nutmeg liver). Tubercular deposits in various organs of the body. Tubercular ulcerations of the larynx, trachea, and intestines (see partial enteritis). Of Louis' cases, ulceration of the larynx occurred in $\frac{1}{5}$, of the trachea in $\frac{1}{3}$, of the intestines in $\frac{5}{6}$. With regard to the ultimate pathology of tubercle, various opinions have been formed. It is originally a cellular formation, the constituent cells being imperfectly developed; many are little more than mere nuclei, and the largest are rather smaller than pus corpuscles. Virchow shows that the tubercle corpuscles, like those of pus, are developed from the corpuscles of the connective tissue. As long as the cells remain unaltered, the tubercle retains its grey semi-transparent appearance, but sooner or later they become disinte-

Due to growth of spores.
Indivisible - as proved by Villermé & others

grated into fatty granular debris, and the tubercle is changed into a yellowish cheesy mass. Fig. 62 shows the whole succession of transitions from (a) the connective tissue corpuscles, up to the production, by the division and multiplication of their nuclei, of the tubercle corpuscles (b). These in the centre of the tubercular mass, are undergoing disintegration into cheesy matter (Virchow).

COMPLICATIONS.—Bronchitis, pneumonia, and pleurisy, followed by adhesions or by pneumothorax. Ulceration of the larynx and trachea. Extensive disease of the liver; inflammation of the peritoneum; œdema of the ankles, anasarca, ascites; ulceration of the intestines; fistula in ano; mania.

DURATION.—The average is about two years. In acute cases, from a few months to one or two years. In very acute cases, three weeks or a month. In chronic cases, death often takes place after the lapse of years, and after repeated attacks of hæmoptysis.

CAUSES.—*Predisposing*. Hereditary predisposition (in about one-fourth of the cases); the scrofulous diathesis; adult age. The male sex. A particular formation of the body, marked by a long neck, prominent shoulders, narrow or deformed chest, long slender fingers, with filbert nails, regular white teeth, and gums with a deep red margin; thin upper lip; a fine clear skin, delicate complexion, fine hair, varying from light to dark chestnut, light blue or grey eye, with large pupil and long eyelash; or the black hair, dark eye, and sallow complexion. Sedentary life; a close and confined atmosphere; insufficient and unwholesome food; depressing passions of the mind; dissipation and intemperance; profuse evacuations; and all causes of debility. *Exciting*.—Foregone attacks of pneumonia, catarrh, asthma, scrofula, syphilis, variola, rubeola. The dust to which certain artificers are exposed, as needle-pointers, stone-cutters, pearl-button makers, millers, &c. Irritating fumes.

MORTALITY.—The disease is ultimately fatal (but often after several attacks) in the vast majority of cases. It destroys about a ninth part of the English population, and about a fifth part of those who attain the adult age. In the metropolis it causes about a seventh of the deaths at all ages, and about a fourth of the deaths of adults. The old bills of mortality show a like proportion of deaths among adults.

DIAGNOSIS.—The symptoms and physical signs taken together, render the diagnosis of confirmed phthisis easy, but it is often difficult in the incipient stage, in cases of extensive miliary deposit without suppuration, and when complicated with other chest affections. The following observations may facilitate the diagnosis. The first onset of phthisis is marked by very slight and very variable symptoms. One patient complains merely of debility; a second, of debility and slight emaciation, for which he can assign no cause; a third, of distressing perspiration on slight exertion; a fourth, of constant pain in the forehead; a fifth, of dyspepsia; a sixth, of muscular pains; a seventh, of

diarrhœa; an eighth, of hæmoptysis; a ninth, of slight hacking cough, with scanty mucous expectoration in the morning; a tenth, of palpitation. Another patient has been subject to winter cough, or what he terms asthma, for years, but never suffered so much in previous winters: his cough, for the first time, continues throughout the summer months. A few well-directed inquiries will generally bring to light some additional symptom actually existing, or present at some former period; but, in spite of the most careful inquiry, the case will often remain obscure, and the physician will be tempted to stop at the most obvious symptom, and to direct his treatment to its removal; unsuspecting of the lurking disease which is its cause. In all these obscure cases, the character of the pulse is especially deserving of attention, as it affords indications quite as valuable as those obtained by an examination of the chest. When the disease is advanced it is most liable to be confounded with bronchorrhœa, with dilated bronchi (see Bronchitis), and with suppuration of the lung after pneumonia. From the latter it will be distinguished by the previous history, and by the character of the sputum.

The Pulse in some cases excites suspicion, in others confirms it, by 1, increased frequency; 2, diminished volume; 3, increased quickness or sharpness; or 4, by all three combined.

1. In five out of six cases the number of the pulse in phthisis exceeds the highest number (92) observed in *apparently* healthy males of the same mean age; while in the great majority of instances it exceeds the average. Sometimes this increased frequency of pulse accompanies the first feelings of indisposition, and continues throughout the whole duration of the disease. I have known it as high as 140, where debility was the only marked symptom. On the other hand, cases do occur, though very rarely, in which the pulse is even less frequent than the average in health. [Jan. 1853.—P. D., aged 34, a policeman. When 24 years of age he had an attack of pneumonia (?), which confined him to bed for six weeks. During the attack he spat half a pint of blood mixed with yellow sputa, for several days in succession. When 26 years of age, he had an attack of pleurisy, for which he was bled. During the two years that he has been in the police force he has always had a cough, and when aged 33, again spat a little blood. Spits large quantities of yellow sputa, but no blood at present. There is dulness on percussion above and below both clavicles, with cavernous respiration, increased expiratory murmur, and pectoriloquy above the right clavicle; increased expiratory murmur and slight crepitus above the left clavicle. Pulse, standing, 64. He is still able to follow his employment. August, 1853.—External appearance and symptoms little changed, but the pulse now above 100, in the same posture. June 1858.—Still in delicate health, but following his employment as a beadle.] 2. The diminished volume of the pulse is an almost constant character, and is present even in such exceptional cases as the above. 3. The quickness of the pulse—that is to say, the promptitude with which each separate pulse rises beneath the finger—is also even more constant than the increase of frequency,

and may exist with a pulse of 70. The pulse of health is exactly the reverse of this, rising slowly, and, as it were, deliberately, beneath the finger; so also is the infrequent pulse of mere debility. To quickness is superadded smallness of pulse in phthisis, whilst the pulse in health is of moderate fulness. 4. The combination of the three characters of pulse—the frequency, the smallness, and the quickness—should always lead to an examination of the chest; but the small quick pulse alone is sufficient ground of suspicion. These observations apply only to men, as the characters here pointed out form a striking contrast to those of the male pulse both in health and disease; while, on the contrary, the pulse of the female, even in health, possesses these three characters in a marked degree, and assumes them in most functional and in many organic diseases. A small, quick, and frequent pulse is, therefore, less indicative of consumption in women than in men. The slight effect produced by a change from the erect to the sitting posture will also assist the diagnosis in the male, by distinguishing the debility of phthisis from simple debility due to other causes. Whenever, then, a man presents himself for advice, complaining of debility, or of other obscure symptoms of phthisis, or even of symptoms proper to functional diseases of other organs, and is at the same time obviously free from acute disease, the pulse should be examined, and if, after allowing the patient's agitation to subside, the pulse is either very small and frequent, or very small and quick, or if it combine all these characters of increased frequency, smallness, and quickness, the chest should be examined, and in by far the majority of cases the physical signs will be found to justify the suspicion raised by the pulse. In examining persons offering themselves for assurance, the state of the pulse should be particularly attended to. It may be well to observe that, in consequence of the quickness of the pulse (the promptitude with which each beat is performed), the pulse usually seems much less frequent than it is. It should, therefore, be always counted by the watch. (G.)

Headache.—Another symptom often present, and already cursorily alluded to, is headache,—dull, persistent pain in the forehead and over the eyes.—This symptom, too, has often led me to examine the chest, and in the majority of instances with the result of confirming my suspicions. (G.)

Palpitation.—This also is often the very first symptom which engages the patient's attention. (G.)

PROGNOSIS.—*Unfavourable*, as to the ultimate event, but guarded as to the event of an existing attack, for the patient may survive three, four, or more severe attacks in succession. An existing attack is likely to terminate fatally when there is a high degree of hectic fever; great frequency of pulse and respiration; great emaciation and debility; a morbidly-clean or fiery-red tongue; fixed pain in the chest; colliquative sweats or diarrhœa; profuse purulent expectoration; œdema of the legs; aphthæ; and stethoscopic indications of extensive and advanced disease, or of the supervention of pneumonia or pleuritis.

There is a better prospect of a favourable result to an existing attack when the disease is limited in extent, and not traceable to hereditary predisposition; when there is little loss of strength and flesh; when the pulse and respiration are but little increased in frequency; when there are no night-sweats, no diarrhoea, and no complications. When the disease is very limited, ultimate recovery is a possible, though very rare, event; and every experienced physician has met with a few cases in which men who had every symptom of consumption in early manhood have attained to advanced age. (See two cases in Heberden's Commentaries.) In females, the first attack is more generally fatal than in males.

Pneumonia, occurring in the young or middle-aged adult, not yielding readily to treatment, and accompanied by a rapid loss of flesh and failure of strength, is probably due to tubercular deposit. Bronchitis also, occurring at the same periods of life, and characterised by similar features, is probably due to miliary deposits scattered through the whole, or the greater part of both lungs.

TREATMENT.—I. Of incipient phthisis. II. Of confirmed phthisis.

1. In *incipient* phthisis, the indications are—(a.) to promote the absorption of the tubercular matter; (b.) To prevent or subdue local inflammation; (c.) To improve the general health.

(a.) With a view to promote the absorption of tubercle, two remedies have been recommended—viz., mercury and iodine; the first to be given so as slightly to affect the system; the second, in the form of iodide of potassium or of iron. Iodine may also be inhaled with the steam of warm water. There is no sufficient reason for believing that these or any other remedies possess any power of removing tubercular deposits; and a course of mercury is to be deprecated.

(b.) Local inflammation may be prevented by guarding against cold and all those causes which excite the circulation. Warm clothing; the avoidance of exposure to wet and cold; and a proper attention to the state of all the secretions, will fulfil the first part of this indication. Inflammation, where it already exists, may be subdued by leeches applied occasionally over the site of the painful spot; by counter-irritants to the upper parts of the chest, of which croton liniment and tartar-emetic ointment are the best.

(c.) The general health may be improved by proper exercise, wholesome diet, regular habits, pure air, change of air, especially to the seaside, sea voyages, cold sponging followed by friction every morning. Chalybeate tonics. Iodide of iron. Cod-liver oil if there be emaciation.

II. In *confirmed* phthisis—that is to say, where suppuration has already taken place—the indications are—(a.) To facilitate expectoration; (b.) To subdue local inflammation; (c.) To mitigate distressing symptoms; (d.) To support the patient's strength.

(a.) The first indication is fulfilled by emetics. When the patient's strength is little impaired, and the expectoration is abundant, they may be given with the best effect. A scruple of sulphate of zinc should be taken on first rising in the morning, every day, or on alter-

nate days, or once or twice in the week, according to the strength of the patient, and be followed up by a moderate quantity of warm water or warm camomile tea.

I am inclined to restrict the use of emetics to those cases in which there is abundant expectoration. In incipient phthisis, attended with a dry cough, or scanty expectoration, emetics are as useless as they might *à priori* be expected to be. (G.)

(b.) Local inflammation must be combated as above indicated.

(c.) The most distressing symptoms are night-sweats, cough, febrile flushes, palpitations, sickness, diarrhœa, and hæmoptysis. The *palpitation* may be relieved by digitalis, in doses of from x to xx drops of the tincture; the *cough*, by small doses of opium, by the compound squill pill, in combination with the extract of conium, or by small and repeated doses of the more powerful sedatives. Of these, the best is extract of stramonium, in the dose of the sixth of a grain made into the form of lozenge with extract of liquorice, and sucked frequently in the course of the day and night when the cough is most urgent. A linctus containing chloroform and hydrocyanic acid may also be given with advantage. The *febrile flushes* are relieved by cold sponging and cooling drinks. The *night-sweats* often subside under the use of the dilute sulphuric acid, in the dose of twenty drops. This may be combined, when there is much restlessness, with a quarter of a grain of morphia. The distressing *sickness* which sometimes accompanies phthisis is relieved by the use of ℥i. to gr. v. dilute hydrocyanic acid, in combination with gr. x. of subnitrate of bismuth, with a bland farinaceous diet. *Diarrhœa* commonly subsides by strict regulation of the diet, and the prohibition of every form of solid food. If it be caused by ulceration, the treatment recommended under partial enteritis must be adopted. In *hæmoptysis*, the dilute mineral acids (Acidi sulphurici dil. ℥ xx.), or, if these fail, the acetate of lead with an excess of acetic acid, and small doses of opium and digitalis (℞ plumbi acetat. gr. v. Acidi aceticæ f. ʒi. Tinct. opii ℥ v. Tinct. digit. ℥ x. Aquæ f. ʒi.)

(d.) The patient's strength will be best supported by nourishing diet, without stimulants. In the last stage of the disease, however, stimulants, such as wine and ammonia, may be administered with advantage.

REMEDIES. — Neat's-foot oil. Glycerine. Cod-liver, or neat's-foot oil rubbed into the skin of the chest, when the stomach rejects the oil. The inhalation of oxygen, iodine, chlorine, hydrogen, hydro-carbon, and the vapours of tar. Alcohol. Naphtha. The Iceland or Irish moss. In incipient phthisis, it is obvious that a sea voyage, or a change of air and scene, or a change from a low damp spot to a dry bracing air, would be as useful as to any other person whose health had suffered impairment from whatever cause. This is probably the extent to which change of climate is beneficial in the early stage of phthisis. As, however, it has lately been shown that, in the East Indies, there is among our troops, as well as among the natives, a remarkable improvement in weakened systems the inhalation of sulphuretted hydrogen might be even more beneficial than sulphurous acid as it is still more destructive to vegetable life. Plants once blighted by it never recover.

munity from consumption, a residence in that climate may be reasonably recommended, both to persons labouring under the incipient disease, and to families deeply tainted with scrofula.* The places now usually recommended have not this probability in their favour, and the evidence in support of the change is on a level with that in favour of tar-water, naphtha, frictions to the spine, or dry-cupping to the chest. The fact is, that everything that has ever been recommended, however trivial, has seemed to effect a cure of consumption, simply because patients labouring under phthisis do continually recover from existing attacks, and in rare instances regain perfect health, though pent up in towns, breathing the foul air of crowded workshops, living in unhealthy habitations, and surrounded by every unwholesome influence; exposed, in a word, to the continued action of the predisposing and exciting causes of the disease; while, on the other hand, many cases stated to be phthisis are merely sympathetic functional disorders of the lungs, or real diseases of the lungs of a non-tubercular origin. To recommend a change of climate in advanced stages of consumption is as unwise as it is cruel. But in incipient cases, a change may be fairly recommended, if it do not entail great inconvenience. But in all cases it is a choice of evils, which ought to be fairly stated. The benefit is not sufficient to counterbalance a great amount of inconvenience or a large pecuniary sacrifice. This moderate estimate of the beneficial effect of change of climate is founded upon facts and reasonings which the narrow limits of this work do not permit to be stated. (G.)

PROPHYLAXIS.—Persons who have an hereditary predisposition to phthisis, those who have habitually delicate health, or whose chests, on examination, prove to be unsound, require unusually careful management of their health. During childhood, nourishing and wholesome food, proper exercise, warm clothing, frequent ablution of the skin, pure air within doors, both in day and sleeping rooms, moderate application of the mind, and careful attention to the state of the bowels, are necessary. During youth and manhood such exercises as tend to expand the chest, especially fencing and military drill for men, and archery for women; exercise in the open air, especially horse exercise; the cold sponge bath every morning, followed by friction; the moderate employment of the voice in singing or reading aloud; and careful avoidance of all excesses, bodily or mental, should be insisted on. All unwholesome employments and all sedentary occupations should be avoided. Residence in a dry warm climate, such as Undercliff, Torquay, Hastings, Cork, Madeira, the East and West Indies, the south of France, or Italy, Algiers, Cape of Good Hope, or Australia. Astringent chalybeate tonics.

* I leave this passage unaltered, though some facts which have recently come under my notice lead me to speak with more hesitation upon this point. (G.)

DISEASES OF THE PLEURA.

PLEURITIS . . .	Inflammation of the pleura.
HYDROTHORAX . .	Water in the chest.
PNEUMOTHORAX . .	Air in the chest.

PLEURITIS—INFLAMMATION OF THE PLEURA.

VARIETIES.—1. Acute ; 2. Chronic.

1. ACUTE PLEURISY.

SYMPTOMS.—*General.* After rigors, and the usual symptoms of inflammatory fever, a sense of weight in the chest, which in a few hours becomes acute pain, referred to the side, about the level of the nipple, thence shooting to the sternum, clavicle, and arm-pit, and in rare cases over the whole of the affected side. There is a short dry cough, unless the disease be complicated with bronchitis, pneumonia, or phthisis : in which case, the patient expectorates sputa characteristic of those diseases. The countenance is expressive of anxiety ; the breathing is short and catching, and performed chiefly by the abdomen ; the pain is increased by deep inspiration, by the act of coughing, or by lying on the affected side. The pulse is frequent, hard, and contracted, vibrating under the finger like the tense string of a musical instrument. The tongue is covered with a white fur ; the urine is scanty and high-coloured ; the skin hot, and the cheeks flushed.

Sometimes severe and extensive inflammation of the pleura occurs without these well-marked characters. The pain is more diffuse, less severe, or produced only by pressure between the ribs of the affected side ; and in some instances it is altogether absent. In most cases the acute pain, as well as the fever, subside on the third or fourth day, and the cough and dyspnœa abate, though the pleura is still in a state of inflammation.

Local.—When the disease is recent, the effusion scanty, and the surfaces of the pleuræ not adherent, there are feeble respiratory murmur from diminished motion of the chest, dulness on striking the pleximeter lightly and quickly with the fingers, friction-sounds accompanying the movements of respiration, cessation of vocal fremitus, and ægophony. If adhesion takes place, the friction-sounds cease ; and if effusion occur to a considerable extent, the physical sounds are those stated under Empyema. (See Empyema.)

TERMINATIONS.—In resolution ; in adhesion ; in effusion followed by collapse of the lung ; in the chronic form.

MORBID ANATOMY.—Injection of the subserous cellular membrane with dryness of the surface of the pleura ; effusion of coagulable lymph, or of pus mixed with flakes of lymph ; and recent adhesions.

CAUSES.—*Predisposing.* Those of other internal inflammations. *Exciting.*—Cold ; external injuries, fractures of the ribs, &c. ; febrile states of the system ; inflammation of the adjoining textures ; tubercles in the lung.

DIAGNOSIS.—From *pleurodyne*, by the presence of severe constitutional symptoms, and of the characteristic local signs. From other diseases of the chest, by the appropriate physical signs.

PROGNOSIS.—*Favourable*. A recent attack promptly treated; absence of complications; if the disease be not recent, the absence of hectic, and of great debility. *Unfavourable*.—Rapid and extensive effusion; the disease existing on both sides of the chest; the coexistence of organic disease; hectic fever and great debility; dropsical effusion.

TREATMENT.—*Indication*. To reduce the local inflammation and prevent effusion.

This indication is fulfilled in the robust by a full bleeding from the arm to the approach of syncope, followed immediately by full doses (from a quarter to half a grain, or even more,) of tartarized antimony, every one, two, or three hours, brisk aperients, and a strict antiphlogistic diet. For slighter degrees of inflammation, cupping and leeches may be prescribed. The tartarized antimony may be usefully combined with calomel. The one keeps up the effect of the bleeding, until the other, by slightly affecting the system, puts a stop to the inflammatory tendency.

2. CHRONIC PLEURISY.

SYMPTOMS.—Chronic pleurisy is generally a consequence of the acute form, but it occasionally begins as a subacute disease. In either case, hectic fever, a permanently accelerated pulse, emaciation, dyspnoea, increased by exertion, and inability to lie on the healthy side, are the principal symptoms. These are apt to alternate with symptoms of the more acute form, such as severe pain, and increased hardness of the pulse.

ANATOMICAL CHARACTERS.—Effusions of various kinds in the sac of the pleura; coagulable lymph thrown out on the surface of the membrane, and in various stages of organization; recent adhesions.

TREATMENT.—*Indications*. I. To promote the absorption of the effused matter. II. To support the patient's strength.

I. The first indication may be fulfilled by mercury, carried to the extent of affecting the system, or by the continued administration of the iodide of potassium, the infriktion of iodine unguents, the repeated application of blisters.

II. The general strength may be supported by the cautious use of tonics; and in cases of great debility, or where the disease has supervened on fever or erysipelas, by stimulants and a nourishing diet.

These measures will often lead to the absorption of the effused matter; but where this is very considerable, and especially when it consists chiefly or wholly of purulent matter, absorption rarely takes place, and the disease now takes the name of *empyema*.

HYDROTHORAX—EMPYEMA.

The former term signifies a collection of serum, the latter a collection of pus, in one or both cavities of the pleura. The physical symptoms are the same whether the fluid be pus or serum. At first it is impossible to declare positively which of these two fluids constitute the effusion. The *general symptoms* are those of chronic pleurisy. When the effusion into one side of the chest is considerable there is dyspnœa, increased upon exertion; and most considerable during the night, when the body is in the horizontal position. There is a distressing sense of weight and oppression at the chest; the countenance is pale; sometimes, however, it has the asthmatic purple tinge, and wears a peculiar and striking expression of anxiety. There is palpitation of the heart, sometimes so great as to be both seen and heard, and cough, with expectoration generally tinged with blood. In describing his sensations, the patient frequently speaks of breathing through water. There is great difficulty in lying on the side opposite to the one affected; but when the disease exists in both cavities of the chest, the patient is incapable of lying down at all, and is obliged to be supported by pillows.

When the effusion is purulent, ulceration is apt to occur in some of the surrounding textures, and an opening is formed into the lungs, through the walls of the chest, or through the diaphragm. The bones may also become carious in consequence of the pressure to which they are subject. When the matter points externally, fluctuation is perceived in the part, and the integument becomes tense during expiration. When an opening takes place into the lungs, a large quantity of matter of an offensive odour is discharged during a fit of coughing, and this is followed by great relief to the respiration. If the opening take place externally, the discharge of matter is increased by strong expiration, as in coughing.

The *local signs* are as follows:—Enlargement of the diseased side, proportioned to the extent of the effusion; the ribs raised as in a deep inspiration; the intercostal spaces protruded, so as to be on a level with the ribs; sometimes perceptible fluctuation in the intercostal spaces: when the effusion is very considerable, universal dulness on percussion in all postures, with absence of respiratory murmur; when in less quantity, the dulness on percussion, and the respiratory and vocal sounds shift with the position of the body. In extreme cases, the heart is displaced so as to beat on the right side. Puerile respiration on the sound side, proportioned to the degree of compression on the lung of the diseased side. When the effusion is not very considerable, ægophony, generally most distinctly heard about the angle of the scapula.

TREATMENT.—Having failed to produce absorption by the general and local treatment above mentioned, it will be necessary, as soon as the breathing is much interfered with, to resort to an operation for its removal. If we have reason to believe that the fluid is serum, the operation should be delayed as long as is consistent with the safety of

the patient; but it should not be delayed too long, or the lung will, in that case, become so completely collapsed and its structure altered as not to admit of re-expansion during respiration. If we have positive indications that the fluid is pus, we must evacuate it at once. If the matter should point in any part of the chest, that part is to be preferred for the opening which should be effected with a scalpel, and a large orifice made for the free evacuation of the pus. If there be no pointing, we must select a spot midway between the spine and sternum, and if the effusion be not very great, a small incision being previously made through the skin with a scalpel, a full-sized trochar should be pushed horizontally inwards, perpendicular to the median plane, above the upper margin of the fifth rib on the left side, of the fourth on the right side. When the effusion is great, we may operate above the fifth right rib, and the sixth left rib. Before the introduction of the trochar, the skin should be drawn upwards, so that afterwards the external and internal opening may not coincide. We must prevent the introduction of air during the operation; to do this effectually, the canula should be attached to an india-rubber tube, filled with water, and its open extremity dipping into a vessel of water; by means of a stop-cock the fluid should be allowed to flow *very slowly* out of the chest; and meantime we should ascertain, by the stethoscope, whether the lungs are expanding in proportion as the fluid is escaping. As long as they continue to expand, we may allow the fluid to slowly flow; but as soon as they cease to expand we should intermit the flow, or air will be admitted into the pleural sac. The more slowly the fluid is evacuated, the less chance there will be, both of the admission of air and of the renewed effusion of fluid. Simultaneously with the withdrawal of the canula, and while the patient is holding the breath, or *expiring*, the integument should be slipped over the orifice in the chest wall, and retained there by means of adhesive plaster. If we discover the fluid to be pus, the canula may be withdrawn and a free incision made. (J. H.)

Pressure by means of a bandage may be advantageously employed both during and after the operation. For more minute details, consult works on surgery.

In many cases the discharge of the effused fluid, whether brought about by internal remedies or by operation, cannot take place without more or less affecting the shape of the chest; the lung may be either permanently condensed by the pressure, or bound down by firm adhesions. As the fluid, then, is absorbed, the walls of the chest must fall in, and this shrinking of the diseased side may be ascertained by measurement. The depression first shows itself in the upper part of the chest, but, as the absorption proceeds, involves the whole of the affected side. The shoulder falls, and remains more fixed than that of the sound side, the ribs are closer together, the scapula approaches the spine and is more prominent, and the spine itself is often concave towards the same side; the contents of the abdomen, too, are pressed upwards on the affected side, whilst the lung of the sound side, expanding beyond its usual limits, displaces the mediastinum and the heart. These changes are accompanied by appropriate physical signs of condensed lung, namely, dulness on percussion, impaired respiratory

murmur, bronchophony, and vocal fremitus. When the effusion is partial and confined by adhesions, the contraction will also be partial, and the physical signs more limited in their extent. Pleurisy may occur in young people, and lead to great deformity, without much impeding the function of respiration; but when it attacks the adult, it generally leaves behind it some dyspnoea, with a strong tendency to a recurrence of the disease.

PNEUMOTHORAX—AIR IN THE CHEST.

Air may find its way into the cavity of the pleura in two ways:

1. By an opening from the lungs, or through the walls of the chest.
2. By secretion. The first is the more common cause.

SYMPTOMS.—These vary with the circumstances under which the opening takes place, and with the previous condition of the pleura. When, in consequence of a superficial ulceration of the lung, an opening takes place into a previously healthy pleural sac, the entrance of air gives rise to dyspnoea, acute pain, dry cough, spasms of the intercostal muscles, a frequent, feeble and sometimes irregular pulse. These symptoms, which take place more or less suddenly, according to the size of the opening, are soon followed by those of inflammation of the pleura. When inflammation already exists, the presence of air not only tends to increase it, but converts the otherwise inodorous pus into a highly-offensive discharge.

PHYSICAL SIGNS.—Unusually clear tympanitic sound on percussion, with great indistinctness or total absence of respiratory murmur on the affected side: the breathing possesses an *amphoric resonance*, and the voice and cough are accompanied by a metallic ringing echo, like that produced by speaking under a stone arch. There is increased distinctness of the respiratory murmur on the sound side. When there is liquid as well as air in the sac of the pleura, the physical signs are, dulness on percussion as high as the level of the fluid, that level shifting with change of posture; *metallic tinkling*, and a splashing of fluid on succussion.

PROGNOSIS.—Generally unfavourable. In some instances, life is prolonged for many months.

TREATMENT.—This depends upon the stage of the disease, and the state of the patient. The sudden rupture of the lung is generally followed by symptoms of collapse and irritation, which may require stimulants and opium; when inflammatory symptoms come on, antiphlogistic measures must be prescribed, proportioned to the severity of the symptoms and the patient's strength. It may be necessary to resort to local depletion by cupping or leeches, and counter-irritation. Tartar-emetic may be given in nauseating doses, and the bowels should be kept free by gentle aperients. When extreme dyspnoea is present, an opening must be made with a fine trochar to give exit to the air, and this should be done at a part of the chest below the level of any liquid which it may contain. The operation may be repeated if necessary.

CHAPTER IV.

DISEASES OF THE DIGESTIVE CANAL AND ABDOMINAL VISCERA.

1. Diseases of the Mouth, Fauces, and Gullet.
2. Diseases of the Stomach.
3. Diseases of the Intestines.
4. Diseases of the Stomach and Intestines.
5. Diseases of the Peritoneum.
6. Diseases of the Liver, Pancreas, and Spleen.

DISEASES OF THE MOUTH, FAUCES, AND GULLET.

STOMATITIS	Inflammation of the Mouth.
GINGIVITIS	Inflammation of the Gums.
GLOSSITIS	Inflammation of the Tongue.
TONSILLITIS	Inflammation of the Tonsils.
PAROTITIS	Inflammation of the Parotid Gland.
CYNANCHE THYROIDEA . .	Bronchoecle.

STOMATITIS—INFLAMMATION OF THE MOUTH.

VARIETIES.—1. Stomatitis erythematosa; 2. Stomatitis follicularis; 3. Stomatitis membranosa; 4. Stomatitis fungosa (aphthæ); 5. Stomatitis ulcerosa; 6. Stomatitis mercurialis; 7. Stomatitis gangrenosa.

1. STOMATITIS ERYTHEMATOSA.

SYNONYM.—S. vesicularis.

SYMPTOMS.—This is a disease of early infancy. It is characterised by redness and heat, and sometimes by dryness, of the mouth and tongue, and the eruption of groups of minute vesicles on the top and around the edges of the tongue. It often coexists with inflammation of the stomach and bowels. In infants from the seventh to the ninth month fever is often superadded. The inflammation may be confined to a part, or it may extend to the whole mouth, and even to the lips, which swell, excoriate, and sometimes become the seat of *herpes labialis*. The chronic form of the disease is often attended by profuse salivation.

TREATMENT.—If the mouth and tongue be dry, a piece of lint or fine sponge moistened with thin barley-water should be frequently passed over them. The diet should be of milk combined with a little fluid magnesia, and given, if the bowels be irritable, in small quantities at short intervals.

2. STOMATITIS FOLLICULARIS.

SYMPTOMS.—Large, roundish, elevated, white, thick-walled, distinct vesicles, situated on the inner surfaces of the lips and cheeks, upon the sides of the tongue, and on the gums. The vesicles usually present a depressed centre and a minute point, which is the sealed orifice of the follicle. They soon rupture, and discharge a little glairy fluid. A minute superficial ulcer, bounded by a red margin and inclined to spread a little distance, follows.

The disease attacks children about the time of the first teething. Old people are also liable to it.

CAUSE.—Inflammation of the mucous follicles, and simple racemose glands, sympathetic with some disorder of the alimentary canal.

TREATMENT.—For infants $\frac{3j.$ doses of solution of bicarbonate of magnesia, and the topical application of solution of nitrate of silver. In adults the general health must be improved by restoring the disordered function of the alimentary canal.

3. STOMATITIS MEMBRANOSA.

SYNONYM.—Stomatitis morbillosa (Reubold).

SYMPTOMS.—This disease is sometimes confounded with aphthæ. It presents itself in two forms:—1, as small white points spreading over the tongue and inside of the mouth into large thin white patches; 2, as a false membrane covering the entire tongue and inside of the mouth. Sometimes the patches are tinged with bile, or with a sanguineous exhalation from the mucous membrane.

When the inflammation of the mouth subsides, the secretion is suspended, and the false membranes are detached, and disappear, leaving an inflamed surface beneath. If the inflammation continue, the white spots unite and form a large patch on the surface of the tongue, lips, or cheeks, or on the whole lining of the mouth. The inflammation may involve all the mucous surfaces, extending along the whole alimentary canal from the mouth to the anus; and down the trachea into the lungs.

When the disease is mild or partial, there is scarcely any constitutional disturbance; but in the severe forms, and when the disease extends to the stomach and bowels, or along the mucous membrane of the air-passages, there is hot and dry skin, urgent thirst, frequent pulse, and other symptoms of fever. When the palate, tonsils, larynx, and trachea are affected, the voice is hoarse, and the cry dull.

CAUSES.—*Predisposing.* Early infancy; debility; an attack of measles. *Exciting.*—General derangement of the alimentary canal.

The disease does not appear to be contagious, as MM. Baron and Billard have frequently observed healthy infants drinking from the same cup as the diseased, without contracting the disorder.

TREATMENT.—In simple and mild cases the mouth should be washed frequently with barley-water, or with some mucilaginous decoction containing a small quantity of the liq. sodæ chlorinatæ. In more severe cases, alum or sulphate of zinc, dissolved in syrup (gr. v. to fʒi.), may be substituted. The bowels should be regulated by gr. i. of hyd. c̄retâ, followed, after an interval, by a tea-spoonful of castor oil. Diarrhœa, if present, should be cautiously treated by very small doses (gr. $\frac{1}{2}$ to gr. i.) of pulv. c̄retæ aromat. c. opio, twice or thrice daily; and the diet (unless the infant be suckled) should be restricted to fresh milk given in small quantity at short intervals—a table-spoonful every hour.

4. STOMATITIS FUNGOSA—THRUSH.

Under the specific name *fungosa* are included all the varieties of aphthous affection which are known to be due to the presence of fungi. (J. H.)

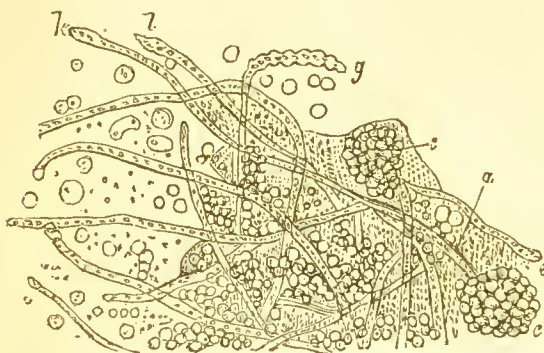
DEFINITION.—Mouldiness of the mucous membrane of the mouth.

SYNONYMS.—Aphthæ. Muguet. Millet.

DESCRIPTION AND SYMPTOMS.—White, opaque, conical, irregularly-rounded or ring-like, elevated patches, appearing alone or simultaneously on the inner surface of the lips and cheeks, on the gums, palate, tonsils, upper and lower surfaces, and more especially the sides of the tongue. Sometimes the disease extends down the œsophagus into the stomach, and along the respiratory passages into the bronchi. In aggravated cases the patches become confluent, and form a loose, ragged membrane of a dirty-white or greyish colour, extending over a considerable portion of the tongue or cheek. The patches soften down and become ragged on their surfaces, and after a variable time, from ten hours to several days, separate, and leave either a smooth, red, unbroken surface, or a superficial excoriation. The abraded surface may now become covered with healthy epithelium, or the diseased condition may be reproduced, and be removed and reproduced again and again. This affection of the mucous membrane is a frequent accompaniment of gastro-intestinal irritation in weakly infants. There is increased difficulty of sucking and swallowing. If the disease extend into the alimentary canal, it will be liable to produce vomiting and diarrhœa, with mucous stools. Coughing and mucous expectoration, mixed with grey aphthous threads, mark its extension into the air-passages. When the child is in a low state of health, the aphthæ sometimes produce unhealthy gangrenous sores, and the surrounding parts become swollen, soft, and livid. There is profuse salivation, and the child, refusing food, becomes pale and cold, and ultimately dies of inanition.

CAUSE.—*Predisposing.* A tender epithelium as in infants, and after desquamation, resulting from local or general disease. The disease affects persons of all ages. *Exciting.*—The development of a vegetable parasite—the fungus called *Oidium albicans*, in the epithelial covering of the mucous membrane. The plant consists of minute tubular jointed filaments, and of bright spherical or oval spores developed at the articulations of the filaments or upon their extremities. The

Fig. 63.



spores, as well as the joints of the thread-like stems, contain one or two bright rounded granules. (Fig. 63.) The filaments grow in between the epithelial cells in every direction, and form a network, into the meshes of which the spores are poured, disturb-

ing and loosening the epithelium, which becomes swollen, opaque, and friable. The disease rarely extends below the cellular layer; but as the deepest growing portion of this layer is frequently invaded, the disease is not thrown off when the superficial parts are separated. Sometimes the disease extends to the corium itself, producing unhealthy superficial ulceration. The racemose glands are a favourite seat of the fungus, their little open-mouthed ducts allowing of its ready introduction to the softer cells within them.

CONTAGION.—Since the disease is dependent upon the growth of a fungus, it follows that its presence, and a favourable condition of the mucous membrane, will always result in its development. The fungus is very probably derived, in the first instance, from some mouldy article of diet. When once established, it may be transferred from one individual to another throughout a foundling hospital. The disease may be conveyed from the child's mouth to the nurse's nipples, and from the latter to the mouths of other children. Imperfect ventilation, and the common use of domestic articles, baths, &c., are other means of propagating the disease.

TREATMENT.—Gastro-intestinal irritation and diarrhœa, which are frequent concomitants of the disease, must be treated on general principles. The mouth should be frequently washed out with a gargle composed of the following:—Mellis boracis ζ ss., aquæ f ζ vii ss. Solution of nitrate of silver (gr. xx. to ζ j.) should be applied once or twice a day by means of a brush to the aphthous patches. Under this treatment the disease soon yields.

Aphthous ulcers of the mucous membrane of the lips and tongue is a frequent concomitant of skin disease, caused by vegetable parasites. I have frequently observed them in persons affected with *dermycosis circinata*, (*herpes circinatus*), and as often as I have examined the epithelial debris of these ulcers, I have been able to detect the spores of some fungus. In one case in which the external disease was confined to two large semicircles on the upper lip, there were two aphthous ulcers on the tongue, one to the left of the tip, the other on the right side near the extremity. This latter was quite depressed, as if partially cicatrised, and extended into the vascular corium. The epithelium forming the margins of the ulcers was opaque and thick. When stripped off, treated with ammonia and æther, and examined, it was found to be pervaded by the fungus represented in fig. 64. All parts of



the mucous membrane are liable to be affected by vegetable parasites, and especially when the vital powers of the individual are depressed, as in the last stages of lingering diseases. The specimen of *Oidium albicans* represented in fig. 65 is from the kidney of an aged patient who came under my care in King's College Hospital. She was admitted in the last stage of pulmonary consumption; her nervous power was much depressed, as was indicated by apathy and low temperature of body. At the examination, which was made thirty-six hours after death, white elevated roughened spots were observed upon several of the mamillary processes of one of the kidneys. On examination, Dr. M. Tonge and Mr.



observed them to be due to the luxuriant development of the fungus here figured, and called my attention to the fact. On examination, I found that the parasite had invaded the vascular tissue of the mamilla for the distance of about a line between the terminations of the tubules. The patient had no eutaneous disease. The mouth was not examined. The urine was not examined microscopically, but the absence of sugar was determined before death. (J. H.)—The vulva and nipples are very liable to the aphthous affection.

5. STOMATITIS ULCEROSA—ULCEROUS INFLAMMATION OF THE MOUTH.

SYMPTOMS.—Inflammation of the gums and jaws, of one or both sides, accompanied by swelling, and followed by ulceration of the margins of the gums; swelling and tension of the cheeks; salivation; fœtor of the breath; redness and heat of the face; injection of the conjunctiva; painful enlargement of the submaxillary glands. The local affection is accompanied by disturbance of the general health, fever, anorexia, and constipation. The ulcers are generally indolent, but occasionally spread till they lay bare the jaw.

CAUSES.—*Predisposing.* The period between the first and second dentitions; all causes of debility. *Exciting.*—Disorder of the stomach and bowels; cold.

PROGNOSIS.—*Favourable*, when the disease is idiopathic. *Unfavourable*, if it follow on fever or scarlatina, according to the severity of the primary disease.

TREATMENT.—I. Local. II. General.

I. The local treatment consists in the use of the diluted mineral acids (one part of hydrochloric acid to two or three of water), or of strong solutions of alum, zinc, or nitrate of silver. Tincture of myrrh may also be advantageously employed. In very severe cases, sulphate of copper or nitrate of silver in substance.

II. The constitutional treatment consists in strict attention to the state of the bowels and the general health: a light nutritious diet, pure air, quinine, or ammonia and bark, should be prescribed. The best aperient will consist of equal proportions of the pulvis rhei, and hyd. c cretâ, in doses proportioned to the age, followed by castor-oil.

6. STOMATITIS MERCURIALIS—MERCURIAL SALIVATION.

SYMPTOMS.—A disagreeable brassy taste in the mouth, looseness of the teeth, tenderness of the gums, a peculiar fœtor of the breath, and a constant profuse discharge of saliva, with flakes of false membrane; shooting pains in the face, stiffness of the jaw, and swelling of the parotid and submaxillary glands. The gums are first marked by a distinct red line, and then become generally red and swollen; little ashy superficial ulcers appear upon them, and they are apt to bleed; after a few days pus oozes from their margins here and there, and they are more or less separated from the teeth. The inflammation may extend to the interior of the cheeks and to the tongue, which then becomes swollen, indented by the teeth, and furred; and it sometimes proceeds to ulceration of the gums and cheeks, and, in rare cases, to gangrene. These local symptoms are accompanied by some degree of fever and general irritation.

The duration of mercurial salivation, in slight cases, is two or three days; in severe cases, ten days or a fortnight; and if ulceration or gangrene ensue, still longer. Several weeks often elapse before the gums are restored to their healthy state.

CAUSES.—The accumulation of mercury in the system from internal administration or external application of some of its compounds.

Some persons are exceedingly susceptible of mercury, while others are with difficulty brought under its influence. Great vigilance is therefore required in its use. A gentleman now under my care for primary syphilis has been suffering for a week from severe stomatitis, with slight ulceration and bleeding of the gums, swelling of the salivary and cervical glands, and severe pain in the jaws. This condition was induced in three days by the infriktion of $\mathfrak{Ji}^*$ of mercurial ointment into the groins, and the internal administration of gr. iiii ss. of calomel in divided doses. He is of a costive habit.

A similar condition was induced in another patient by the repeated application of the ung. hyd. oxidi rubri to an extensive ulcerated surface produced by a burn. (J. H.)

DIAGNOSIS.—In most cases, mercurial salivation is distinguished from spontaneous salivation, from the salivation of pregnancy, and from salivation produced by preparations of antimony, copper, arsenic, and gold, by digitalis, prussic acid, and iodide of potassium, and by several other substances, by the excessive fœtor of the breath.

TREATMENT.—Gargles of alum, zinc, chloride of soda, chloride of lime, tannic acid, hydrochloric acid, acetate of lead, or brandy and water. In more severe cases, and when the gums are ulcerated, a strong solution of nitrate of silver ($\mathfrak{Jss}^*$ to an ounce and a half of distilled water), applied by means of a brush, or nitrate of silver, or sulphate of copper in substance. If much swelling of the glands be present, leeches to the jaws, followed by blisters behind the ears, and warm fomentations. If there be much irritation, opium may be given two or three times daily. Saline aperients and free ventilation, and moderate doses of quinine with acid, complete the treatment.

7. STOMATITIS GANGRENOSA—GANGRENE OF THE MOUTH.

SYNONYMS.—Gangræna oris; cancrum oris; water canker; gangrenous erosion of the cheeks; charbon des oues; wasserkrebs; noua.

ANALOGOUS DISEASE.—Gangrene of the vulva.

SYMPTOMS.—The attention is often first called to a circumscribed, indolent, hard, shining swelling on one cheek (generally the left), without pain, heat, or redness. On examining the mucous membrane of the mouth, one or more ulcers, blisters, or white eschars, will be found on the internal surface of the cheek, lips, or gums. These gradually increase in size, and discharge a dirty sanious fluid, of a highly-offensive odour; the saliva is, at the same time, increased in quantity, and flows from the mouth mixed with membranous shreds. The swelling of the cheek increases till it involves the eyelids and lips. A dark livid spot now occupies the centre of the swelling, increases in size, softens, and sloughs. Gangrene having set in, makes rapid

* $\mathfrak{Ji}$ = 100 grains.

progress both within the mouth and on the surface, and at length involves the whole of the cheek, lips, and gums, and in extreme cases the nostrils, eyelids, neck, and pharynx; the teeth fall out, and the bones of either or of both jaws, and even the cheek and frontal bones, are ultimately attacked. The constitutional symptoms by no means keep pace with the severity of the local affection. In the majority of cases there is no fever, no loss of appetite, and little impairment of strength. The little patient will often continue to run about and play, to sit up, and to amuse himself, till within a short period of his death, the faculties of the mind remaining altogether intact. More rarely the local symptoms are accompanied by fever. Still less frequently the child becomes delirious. Death is ushered in by symptoms of collapse. In cases of recovery, the favourable change is indicated by reaction.

TERMINATIONS.—1. In *recovery*. 2. In partial recovery followed by relapse. 3. In *death* by exhaustion; by starvation from inability to swallow; by hæmorrhage from the separation of sloughs; by the progress of the disease upon which it has supervened; or by complication with hepatisation of the lungs.

COMPLICATIONS.—Pneumonia (58 cases in 63); pleurisy; enteritis; gangrene of the lungs, pharynx, œsophagus, and stomach; gangrene of the extremities, and of the vulva; scrofulous affections.

CAUSES.—*Predisposing*. Age from a year and a-half to twelve years; usual limits three to eight years; most common period, the third and fourth years; in rare cases, as early as fifteen months, one year, three months, or even a few days; also very rarely as late as from fifteen to thirty years; in one instance seventy-two years. The *female sex* (about two females to one male). Improper or insufficient nourishment; the impure air of crowded foundling hospitals and hospitals for children; damp and filthy habitations; low, damp situations, as marshes and the borders of rivers; rainy seasons; the spring and autumn; all the causes of debility and cachexia. *Exciting*—Continued, remittent, and intermittent fevers; the febrile exanthemata—in order of frequency as follows—Measles: small-pox: scarlatina: prolonged gastric irritation; intestinal worms; whooping-cough; pneumonia; congenital syphilis; mercurial preparations in excess, or in children peculiarly susceptible of their action. Contagion.

DIAGNOSIS.—From *gangrenous aphthæ*, by these being confined to the secreting follicles of the mucous membrane, by their number, small size, and slow course, and the absence of swelling of the integuments. From *malignant pustule*, by the absence of the febrile symptoms which precede that affection, which is simply a gangrenous affection of the skin unaccompanied by any disease of the mucous membrane. From *anthrax*, by the absence of acute pain and inflammatory symptoms, by the extensive and rapid destruction of parts, and by the coincidence of disease in the mucous membrane. Anthrax is very rare on the cheek. From most cases of *scurvy*, by this disease being confined to the gums. From the effects of *mercury*, by the history of the case, by the swelling

of the gums, the abundant flow of saliva, the peculiar odour of the breath, the swelling of the tongue, and the numerous superficial ulcerations. The diagnosis is very difficult when either affection is of some standing, and the previous history obscure.

PROGNOSIS.—Extremely unfavourable. Mortality about 75 per cent. In some epidemics every case has proved fatal. An early age, previous great exhaustion, and treatment postponed till the gangrene has fairly set in, are among the unfavourable circumstances.

TREATMENT.—I. Local. II. General.

I. The *local* treatment consists in the employment of stimulating applications. Previous to the appearance of the livid spot, stimulating embrocations, such as the linimentum camphoræ compositum, or the linimentum ammoniæ, to the cheek. Should gangrene have set in, strong acetic, muriatic, nitric, or sulphuric acid, or the actual cautery, the part having been previously incised. Before gangrene has set in, it may be sufficient to apply chloride of soda or of lime mixed with water to the consistence of a stiff paste, or the muriatic or pyroligneous acid, or lunar caustic. When the parts have become gangrenous, the stronger acids, or the actual cautery, must be substituted. When the eschar has separated, the chloride of soda or the chloride of lime in solution, or the weaker acids, may be resumed.

II. The *general* or *constitutional* treatment will depend, in some degree, on the previous history of the case, as well as on the actual condition of the patient. Pure air, scrupulous cleanliness, and nourishing diet, are obviously indicated in all cases. Beef-tea, thickened with arrow-root, arrow-root made with milk, calf's-foot jelly, and wine diluted with water, or added to nourishing articles of food, should be freely and frequently administered. Quinine in the diluted acids, or in wine, and carbonate of ammonia, in doses proportioned to the age of the child, are the best medicines.

The state of the bowels must be carefully attended to. If constipation be present, the compound rhubarb or compound jalap powder, followed by castor-oil or saline aperients, must be given, as often as the state of the bowels require it. Diarrhœa must be checked by the pulv. cretæ aromaticus & opio, or other suitable remedies adapted to that disorder, especially injections of starch and opium; pneumonia, if present, by opium, with full doses of liquor ammoniæ acetatis.

GINGIVITIS—INFLAMMATION OF THE GUMS—PAINFUL DENTITION.

Dentition, or teething, in infants in perfect health is unproductive of pain or disease. In general, however, infants suffer more or less severely during dentition, from irritation in the stomach and bowels, often followed by diseases of the head and chest.

SYMPTOMS.—Dentition is generally accompanied by an increased flow of saliva, and the gum is red, hot, painful, and swollen. The infant puts its fingers, or whatever it can grasp, into the mouth, and presses its gums upon it. Pressure, however, is not borne when true inflammation is present, in which case there is even reluctance to take the nipple. In other cases there is intense inflammation of the gum, extending to the lining membrane of the mouth, and ulceration, followed by aphthæ, or gangrene.

The general symptoms are feverishness, fretfulness, disturbed sleep, determination of blood to the head, often accompanied by diarrhœa and griping pains in the belly; and inflammation of the brain or its coverings. In extreme cases, water in the head, with convulsions, inflammation of the lungs, or laryngismus stridulus. Skin diseases are also of frequent occurrence, of which the most common are strophulus and lichen.

TREATMENT.—In mild cases, gentle friction of the gums; in more severe cases, scarification. The use of the warm bath, the proper regulation of the diet, and a strict attention to the state of the bowels, complete the treatment. The diseases which supervene on teething must be treated on the same principles as the idiopathic affections.

Incision of the gums ought not to be practised unless they are swollen, hot, and painful, in consequence of the pressure of the teeth. When the incision is made prematurely, the appearance of the tooth, so far from being accelerated, is retarded. The incisions should be deep and free. One incision should be made parallel to the alveolar margin; and a second incision transverse to the first.

The gums are subject to swelling, ulceration, and gangrene, both in the infant and in the adult. When these affections occur in the adult, they are generally parts of other more general diseases of the system, such as scurvy, or mercurial salivation; in young children, they are more commonly idiopathic.

GLOSSITIS—INFLAMMATION OF THE TONGUE.

SYMPTOMS.—Inflammation of the whole tongue is a rare disease, except as the consequence of profuse salivation, or the application of strong irritants. More commonly it is of limited extent, appearing at first as a hard tumour on the upper surface. This tumour suppurates slowly, and leaves a deep ulcer, which sometimes penetrates the tongue. It owes its origin, in most instances, to derangement of the stomach and bowels, and is cured by purgatives with the local application of nitrate of silver.

Inflammation of the whole tongue is often a severe and dangerous disease, characterised by heat, swelling, and pain, difficult speech and deglutition, dyspnœa, salivation, swelling of the veins of the neck, and determination of blood to the head, with the usual symptoms of inflammatory fever.

TERMINATIONS.—In resolution, suppuration, or gangrene. In extreme cases it threatens suffocation or apoplexy.

CAUSES.—Mechanical injuries ; strong irritants ; the sting of insects ; salivation ; extension of diseases affecting the tonsils, gums, and cheeks.

TREATMENT.—In the early stage, local depletion, according to the severity of the symptoms, with brisk purgatives and other antiphlogistic remedies, and ice to the surface of the tongue. In a more advanced stage, free incisions. When these remedies fail, and suffocation is threatened, tracheotomy must be performed.

Ulceration sometimes takes place on the side of the tongue, from the irritation of a decayed tooth. In this case, the cause of irritation must be removed by filing or removing the tooth.

Epithelial cancer of the tongue is known by the peculiar hardness of the tumour, the irregular ulceration, the acute lancinating pain, and the cachectic state of the constitution.

Syphilitic ulcerations of the tongue, with foul surface, and irregular hard margins, occupying chiefly its edges, require a course of mercury or iodide of potassium, with the local application of sulphate of copper, or nitrate of silver, in substance.

TONSILLITIS—INFLAMMATION OF THE TONSILS.

VARIETIES.—1 Acute ; 2. Chronic.

1. ACUTE TONSILLITIS.

SYNONYMS.—Cynanche tonsillaris. Angina tonsillaris. Amygdalitis. Quinsy. Inflammatory sore throat.

SYMPTOMS.—After rigors, followed by flushes of heat, pains in the back and limbs, and a full, frequent, and compressible pulse,—a sense of fulness, heat, and dryness in the throat, pain and difficulty in swallowing, and thickness of speech. The throat itself presents a diffused redness, of a deeper colour over the tonsils, which are swollen, and present a number of greyish yellow spots looking like little patches of exudation. They are composed of secretion from the gland blocking up the orifices of its follicles. The tongue is coated with a white creamy fur. As the disease advances, the swelling of the tonsils increases ; the act of swallowing becomes more difficult and painful ; liquids return through the nostrils, and there is a constant discharge of viscid saliva ; the faucial character of the voice and the impediment of the speech increase, the respiration is affected, and there is a painful sense of tension, with acute darting pains in the ears. The febrile symptoms increase in severity with the enlargement of the tonsils, and the pain in the back and limbs becomes more acute ; but in a more advanced stage of the disease, the fever often subsides, or changes its character from

that of inflammatory fever during the first stage, to that of mild hectic during the stage of suppuration.

DURATION.—From five to seven days.

TERMINATIONS.—By resolution, suppuration, ulceration, or gangrene; or in chronic enlargement.

PROGNOSIS.—The disease may be expected to terminate by resolution when the respiration is not much impeded, when the act of swallowing is neither very difficult nor very painful, and when, on examination, the tonsils are not found highly inflamed or much enlarged. Suppuration is to be feared when the disease is prolonged, and does not yield to remedies, when the local pain is acute and throbbing, or when there are rigors or cold shiverings without any evident cause. An abscess is indicated when there is much swelling, a sense of fluctuation on pressure made with the finger, a whiteness of some part of the tumour, and, finally, purulent expectoration. Gangrene is to be dreaded, if the fever be intense, and the pain extremely violent, without any sign of resolution or suppuration. A pinched and sunken countenance, the extremities cold and covered with a clammy perspiration, a small, frequent, weak, and intermittent pulse, and a very fetid odour issuing from the mouth, are signs of its existence.

CAUSES.—*Predisposing.* Childhood, youth, and middle age (it rarely occurs after forty years of age); previous attacks. *Exciting.*—Cold; cold drinks while the body is heated; the deglutition of acrid or stimulating substances; long and loud crying, or singing.

TREATMENT.—When the disease is slight, the treatment proper to catarrh (see Catarrh). When the disease is more severe, it will be necessary at the onset to scarify the tonsils and to apply leeches immediately below the angles of the jaws, followed by a mustard poultice to the throat, and to administer a brisk aperient. When, however, suppuration has commenced, and the gland feels tense and yielding, a lancet should be thrust directly backwards into the most prominent part, and the pus evacuated. The mouth should then be gargled with warm water to encourage the bleeding. If the respiration be much impeded, by great enlargement of the tonsils, emetics will sometimes give relief. If the skin be hot and the pulse strong, saline diaphoretics should be given. If there be much depression, quinine, beef-tea, and wine must be prescribed.

2. CHRONIC TONSILLITIS.

Chronic enlargement and induration of the tonsils often follows an acute attack of tonsillitis; and it is a frequent consequence of scarlatina. It is often of frequent occurrence in cachectic constitutions, and in the chronic forms of dyspepsia.

SYMPTOMS.—Some difficulty in swallowing, thick sibilant voice, impeded respiration, and deafness commonly attend this enlargement of the tonsils; with a liability to attacks of more acute inflammation.

CAUSES.—*Predisposing.* Cachexia, scrofula, and chronic dyspepsia. *Exciting.*—Acute inflammation of the gland; straining of the throat in unskilful use of the voice.

TREATMENT.—The disease is sometimes removed by improving the general health. When, however, it does not yield to constitutional remedies, and the tonsils are of such a size as to impede deglutition or respiration, or to affect the voice, excision may be practised with advantage. The same remedy is recommended in chronic relaxation of the uvula. The ointment or tincture of iodine may be applied externally with benefit. The best internal applications consist of strong solutions of nitrate of silver, or sulphate of copper, or the tincture of iodine, applied by a camel's-hair brush, two or three times a day.

Ulceration of the tonsils may likewise occur in disordered states of health, but it is more commonly one of the secondary effects of syphilis. The disease is generally slow in its progress; but, if not speedily removed, attacks the surrounding textures, extending into the nostrils and fauces, and ultimately attacking the larynx itself. A gargle of the chloride of soda may be used with much advantage, and the ulcers may be frequently touched with nitrate of silver. The general health must be carefully attended to, and the strength must be supported by a nourishing and generous diet. *Syphilitic ulceration of the tonsils* requires the same treatment as other secondary diseases. (See Syphilis.)

The disease known as '*Clergyman's sore throat*,' or '*dysphonia clericorum*,' consists at first in a chronic enlargement of the tonsils and lengthening of the uvula, with a relaxed and congested condition of the mucous membrane of the fauces, which gradually extends to the pharynx and upper part of the larynx. In the most severe cases of the disease, there is also ulceration of the mucous follicles of the parts affected, and the mucous membrane, especially about the pillars of the fauces, is coated with a tenacious secretion. The *symptoms* are dryness and tickling of the throat, constant hawking and spitting, and hoarseness of the voice. After reading or speaking, the hoarseness increases, and is sometimes attended with pain in the upper part of the windpipe. Occasionally the patient loses his voice altogether. The general health is, at the same time, impaired, the patient being in a cachectic state; or the disease may coexist with, or follow upon other diseases of the air-passages and lungs. The disease is generally traceable to a bad habit of reading and speaking in persons of a relaxed habit of body. The treatment will consist in the exhibition of alteratives and tonics to improve the general health, the particular remedies employed being determined by the existing state of the system; and in local measures calculated to remove the relaxed and congested state of the mucous membrane. The best local application is a strong solution of nitrate of silver (℥ss* to ℥i. of water). This should be applied, by means of a camel's-hair brush or a piece of sponge, to the whole of the inflamed surface. If this mode of application should prove insufficient, the solution of nitrate of silver will have to be applied to the upper part of

* ℥i. = 100 grains.

the larynx by means of a whalebone probang tipped with sponge. When there is great enlargement of the tonsils of long standing, excision may become necessary, as in simple chronic tonsillitis. Clergymen suffering in this way should be directed to take a full breath very frequently while reading or preaching, so as to speak from the lungs and not from the throat; and to take lessons in elocution.

PAROTITIS—THE MUMPS.

SYNONYM.—Cynanche Parotidea.

SYMPTOMS.—After slight febrile symptoms, fulness and soreness at the angle of the jaw, with pain on moving the part. The swelling extends by degrees upwards to the space between the cheek and ear, and downwards to the submaxillary gland, occasioning great deformity. On the fourth day it begins to subside. It generally appears at first on one side, sometimes it attacks the other afterwards; less frequently it attacks both sides at once. The disease is sometimes accompanied towards its decline, or it is followed, by painful swelling of the breasts or testicles. It generally terminates in resolution.

Suppurative inflammation of the parotid is a frequent concomitant of the latter stage of typhous, and sometimes of enteric fever also (p. 322). The rapidity with which the inflammation is developed is in many cases very remarkable. Without any premonitory indication, a large congested, very hard and painful swelling will form around the ramus of the jaw in a few hours. The inflammation rarely stops short of suppuration.

CAUSES.—*Predisposing.* The period of childhood. *Exciting.*—Exposure to cold; scarlatina, and other febrile diseases.

CONTAGION.—A medical student had mumps in London, at a time when his mother was staying with him. They remained in town until the swelling disappeared, and then went 100 miles into the country, home. There was no mumps in that neighbourhood; but a fortnight after their arrival one of the children was taken with the disease, and it afterwards successively affected, at regular intervals of a fortnight, each member of a large family. (J. H.)

TREATMENT.—Warm fomentations, with the application of flannel in the intervals; gentle aperients and farinaceous diet. If much inflammation be present, leeches may be applied. The secondary affection of the breasts or testicles must be treated in the same way. Should any swelling remain after the inflammation has passed away, friction with stimulating liniments may be prescribed.

Sometimes a metastasis of the inflammation takes place to the brain. In this case, the treatment will be that of idiopathic affections of the brain. Suppurative inflammation requires tonics and stimulants. The swelling must be incised as soon as it becomes fluctuant.

BRONCHOCELE—CYNANCHE THYROIDEA—GOITRE.

SYMPTOMS.—A swelling affecting the entire thyroid gland, or a single lobe of it; at first firm and elastic, but after a time soft, flabby, and containing small portions of a denser consistence. It grows slowly at first, but after a time increases rapidly, extending in all directions, upwards towards the jaw, laterally beyond the limits of the neck, and frequently hanging over the chest. It sometimes attains an enormous size, in which case it may cause serious inconvenience by its pressure on surrounding parts, on the trachea, and on the vessels of the neck.

MORBID ANATOMY.—Hypertrophy of the gland, either partial or through its whole extent, with enormous enlargement of its vesicles, so that it presents, when cut into, a congeries of cells, varying in size from that of a pea to considerable cavities, and containing fluids of various character and consistence.

CAUSES.—*Predisposing.* Female sex; the age of puberty; hereditary tendency. *Exciting.*—Unknown. The disease is endemic in localities differing widely from each other in all respects. But the most common characteristic of the spots in which it prevails is want of due movement of the air. It is very common in deep valleys shut in by mountains. Combined with idiocy it is the *Cretinism* of the Vallais. The disease is so common in Derbyshire as to have received the name “Derbyshire neck.” It is also very common in the valley of the Teme, and the dale of the Corve, N.W. of Ludlow, particularly in the vicinity of the calcareous beds of the Silurian and Devonian formations. (J. H.)

TREATMENT.—Iodine in the form of ointment, tincture, or paint, externally. Iodide of potassium internally, in doses of one or two grains three times a day. Removal from the district in which the disease originated.

When other means fail, and the tumour, by its pressure, causes great inconvenience, surgical aid may be necessary. Setons have been used with advantage; and the thyroid arteries have been tied with temporary benefit. The tumour has also been extracted; but the operation is attended with alarming hæmorrhage, and has been followed by fatal consequences. Burnt sponge, which contains minute quantities of iodine, was formerly in great repute for the cure of this malady.

DISEASES OF THE ŒSOPHAGUS.

ŒSOPHAGITIS—INFLAMMATION OF THE ŒSOPHAGUS.

SYMPTOMS.—Pain, or a sensation of burning, in the act of swallowing, either in a part of the œsophagus, or through its whole extent. This pain is sometimes increased on pressing the larynx firmly towards the spine. When the inflammation extends to the mucous membrane of the stomach, there is pain in the epigastrium, with vomiting, leading, in some instances, to the expulsion of tenacious casts of the tube. In

cases of œsophagitis, produced by swallowing hot water or corrosive poisons, large flakes of epithelium are often discharged.

CAUSES.—Stimulant and corrosive applications to the tube itself, such as hot water, and the several corrosive poisons. The extension of inflammation from the mouth, fauces, or tonsils; wounds.

TREATMENT.—The appropriate treatment consists in the frequent use of ice or iced water, and a farinaceous liquid diet. So long as the difficulty of swallowing remains very great, the patient must be supported by nutritious injections. After the first or second week a large well-oiled bougie should be carefully passed daily, in order to prevent constriction during cicatrization.

OTHER DISEASES OF THE ŒSOPHAGUS.

The gullet is subject to other functional and structural diseases, among the former of which may be mentioned rheumatism and spasmodic stricture; among the latter, hypertrophy of the submucous tissue, and various malignant degenerations, such as scirrhous and medullary sarcoma. It may also become subject to pressure from aneurism of the aorta or carotid artery, from enlargement of the cervical glands, and from diseases of the spinal column.

Rheumatism of the gullet is a rare disease, characterised by painful deglutition distinctly referred to some part of its course, accompanied by rheumatism of other muscles, and yielding to the treatment proper to muscular rheumatism.

Spasmodic stricture of the gullet is characterised by difficulty of swallowing, accompanied by a sense of choking in the throat, the food either passing into the stomach after many efforts to swallow, or being rejected. It is generally associated with other symptoms of hysteria, and is amenable to the treatment proper to that disease. It is distinguished from organic stricture by the circumstance of its not being constant, but subject to intermissions; by the result of an examination with a bougie; by the history of the case; and the presence of other hysterical symptoms. It requires no local treatment; but in obstinate cases, the daily introduction of a bougie may be attended with benefit.

DISEASES OF THE STOMACH.

CONGESTION	Of the Stomach.
HÆMATEMESIS	Vomiting of Blood.
GASTRITIS	Inflammation of the Stomach.
ULCER	Of the Stomach.
PERFORATION	Of the Stomach.
CARCINOMA	Of the Stomach.
OTHER FORMS OF STOMACH DISORDER.	

CONGESTION OF THE STOMACH.

SYMPTOMS.—The result of congestion of a gland is a diminution of its appropriate secretion. The mucous membrane of the stomach

is an extended glandular surface, and it is also exceedingly vascular. When it becomes congested the secretion of gastric juice takes place slowly, and its total amount is considerably less than that which is derived from the membrane in its healthy condition. Anorexia, dyspepsia, and more or less constipation are therefore the necessary consequences of congestion. Another very constant symptom is a dryish tongue and thirst, due probably to the comparatively dry condition of the mucous membrane of the stomach.

Whenever congestion exists, a slight increased fulness of the capillaries will produce their rupture, and the distended vessels are temporarily relieved by an oozing of blood. The effused blood is acted on by the acid secretion of the stomach, and coheres in black coagula, which may be rejected by vomiting, constituting *hæmatemesis*; or the clots undergo disintegration in the stomach, and are rejected as "coffee ground" or "black" vomit; or they may be passed along the alimentary canal, and, after further alteration during their transit, be ultimately evacuated as a black grumous or pultaceous stool, constituting *melæna*.

Some pain and tenderness in the epigastrium are generally associated with a congested condition of the stomach.

CAUSES.—1. Obstruction to the flow of blood through the liver and thoracic viscera. If a ligature be placed around the portal vein, or the vena cava inferior at the under surface of the diaphragm, blood will ooze from the stomach as a necessary consequence. Some diseases of the liver cause so much obstruction to the portal circulation that they are almost tantamount to a ligature around the portal vein; and obstructions to the flow of blood through the lungs and the heart are nearly equivalent in their effects upon the stomach to obliteration of the inferior cava above the liver. Hence we find congestion of the stomach and its result to be sooner or later a prominent symptom in cirrhosis of the liver; in atrophy from long-continued obliteration of the bile ducts; and in diseases, such as cancerous tumours, which involve and press upon the portal vein. Acute suppression of bile, as occurs in yellow and relapsing fevers, commonly produces severe congestion of the stomach, resulting in vomiting of altered blood. The diseased condition of the lungs which most frequently leads to congestion of the stomach is emphysema; and disease of the mitral valve, which at the same time contracts its orifice and permits regurgitation, is that condition of the heart which most commonly produces the same result.

Congestion of the stomach may be also due to functional derangement. When the mucous membrane of the uterus fails to perform the menstrual function, the stomach sometimes assumes a vicarious office, and a monthly hæmatemesis supplies the place of the catamenia. In some cases this is habitual, and the habit is retained during the natural term of menstruation.

TREATMENT must be directed to the cause of the disease, and at the same time we must endeavour to relieve the congestion of the portal circulation by free watery purgation induced by the non-irritating saline

purgatives, such as potassio-tartrate of soda. The abdominal circulation generally will also be relieved by copious diuresis, to effect which acetate and nitrate of potash may be prescribed. Irritating food and medicine must be carefully avoided in order to prevent the congestion from degenerating into inflammation and ulceration. Strong alcoholic drinks, and even fermented liquors, must be avoided, and the diet must chiefly or exclusively consist of eggs and milk, and of farinaceous and glutinous articles. If there be much pain in the epigastrium, mustard poultices may be applied to this region and a few leeches to the anus. In cirrhosis of the liver it is better to avoid leeching, for the bleeding is liable to be too free.

If hæmatemesis be present, it must be treated as recommended below.

HÆMATEMESIS—VOMITING OF BLOOD.

SYMPTOMS.—Vomiting of dark-coloured clotted or grumous blood in greater or less quantity, often mixed with food, and preceded by a sense of weight and obtuse pain in the region of the stomach. If the oozing be continuous, the countenance becomes blanched. In hepatic disease it is sallow, and the conjunctiva of the eyes tinged with bile. If the effusion be rapid and considerable the patient becomes pale, faint, and sick; and a quantity of bright-red blood is vomited.

CAUSES.—Those of congestion of the stomach; ulcer of the stomach; rupture of an aneurismal tumour into the stomach.

MORBID ANATOMY.—Congestion of the mucous membrane of the stomach, general or partial; congestion or chronic disease of the liver; ulcers in the stomach; malignant disease.

DIAGNOSIS.—From *hæmoptysis*; by the rejection of the blood by *vomiting*, not by coughing; by the presence of food; by the discharge of a large quantity of *dark* blood more or less altered. Blood which comes from the lungs, except when discharged from old cavities, is always fluid and of a bright vermilion colour. But in certain rare cases, the diagnosis of the source of the hæmorrhage is not easy. If, for example, an ulcer of the stomach erode a large arterial trunk, the blood rejected from the stomach may be fluid and scarlet. Again, the blood of hæmoptysis may come up into the mouth without the effort of coughing, and may seem to be vomited rather than coughed up. It may also be unmixed with sputa: and when discharged from old cavities of the lungs, may have remained long enough in them to have lost its bright vermilion hue. But the discharge of a very large quantity, such as a pint, or a quart, of dark grumous blood, even though unmixed with food, may be held to be conclusive of the blood having come from the stomach. When such large quantities are expelled from the lungs, the blood is always of a bright vermilion colour. The condition of the liver and lungs will serve to confirm the diagnosis.

TREATMENT.—Rest, abstinence from food for some hours, and afterwards a bland farinaceous diet.

When the hæmorrhage is excessive, the patient may be made to drink freely of iced-water, or to swallow rough ice, and pounded ice may be applied to the pit of the stomach. The vegetable and mineral astringents, such as gr. v. acidi gallici, or ℥xx. acidi sulphurici diluti; the latter in combination with ℥v-x. tincturæ opii. When the hæmorrhage has been stayed, gr. v. pilulæ hydrargyri, followed by a saline aperient, should be given, and the disease subsequently treated according to its cause.

If the disease be caused by suppression of the hæmorrhoidal or catamenial flux, leeches should be applied to the anus or vulva, together with other appropriate remedies for those diseases.

When the disease occurs in delicate or scorbutic habits, tonics and quinine, with the mineral acids, are indicated.

GASTRITIS—INFLAMMATION OF THE STOMACH.

VARIETIES.—1. Acute; 2. Subacute.

1. ACUTE GASTRITIS.

SYMPTOMS.—An acute fixed pain and sense of burning heat in the pit of the stomach, increased by pressure, deglutition, and the movements of respiration; frequent vomiting of clear viscid mucus streaked or not with blood, attended with increase of pain; intense thirst; great restlessness, and extreme anxiety; the tongue red at its point and margins, or over its entire surface; the pulse quick, small, and hard; the bowels confined.

The disease is rarely limited to the stomach, but extends to the gullet and intestines, being accompanied by pain and difficulty in swallowing, diarrhœa, and extreme tenderness of the abdomen.

TERMINATIONS.—*In resolution*, when the pulse becomes more soft and full, and the other symptoms gradually disappear. *In chronic gastritis*. *In gangrene*, marked by a violent exacerbation of the symptoms, followed by a sudden cessation of pain, a rapid and intermitting pulse, the utmost prostration of strength, cold extremities, delirium, hiccup, and death. *In ulceration, followed by perforation*, characterised by sudden and acute pain, with extreme prostration, followed by the symptoms of peritonitis.

CAUSES.—Drinking ardent spirits or hot water; irritating and indigestible diet. Idiopathic acute gastritis is exceedingly rare, the inflammation being due, in most cases, to the effect of irritant poisons. Prolonged abstinence from food. The presence of arsenic, antimony, or the gouty excitant in the blood.

DIAGNOSIS.—From *enteritis*, by the seat of the pain, as ascertained

by pressure; by the peculiar sense of burning heat in the epigastric region; by the more severe vomiting.

PROGNOSIS.—*Favourable.* The pulse becoming softer, fuller, and less frequent; and the pain and tenderness gradually ceasing. *Unfavourable.*—The continuance of the disease without any marked alleviation of symptoms. Extreme and general tenderness of the abdomen. Symptoms marking the accession of gangrene, or the occurrence of perforation.

MORBID ANATOMY.—The mucous membrane of the stomach universally red, or covered with patches of inflammation, especially around the cardia and pylorus; deep redness of the rugæ; abrasion, ulceration, or “hæmorrhagic erosions,” occurring as a number of brown or soot-black spots, from the size of a pin’s head to that of a pea; or softening of the membrane; gangrene; also dark patches resembling gangrene, but arising from the effusion of blood into the submucous cellular tissue; the blood-vessels full of dark blood. Gangrene and ulceration are rare, but softening is common.

TREATMENT—*Indication.*—I. To reduce the inflammatory action. II. To diminish the irritability of the stomach.

I. The first indication is fulfilled—By bleeding from the arm, or by the free application of leeches to the pit of the stomach. By iced water or ice, externally and internally. By keeping the bowels open, in the absence of diarrhœa, with emollient clysters. By the free and frequent use of mucilaginous diluents, such as gruel, linseed-tea, or barley-water.

II. The sickness, restlessness, and pain are best relieved by carbonic acid water and small doses of dilute hydrocyanic acid (miii. to mv.) combined with tincture of opium.

2. SUB-ACUTE GASTRITIS.

SYNONYMS.—Dyspepsia—Indigestion.

SYMPTOMS.—Want of appetite; nausea; flatulence; heartburn; occasional pain in the epigastrium; sick headache; a sense of fulness and oppression after eating, or a feeling of languor and depression relieved by taking food. These symptoms, variously combined, and generally accompanied by some disorder in the functions of the bowels, in the form of constipation, diarrhœa, or the two conditions alternately, and with more or less derangement in the functions of the liver, constitute the most common form of dyspepsia. A dry cough; cold extremities; headache; furred tongue, with red prominent papillæ; a bitter taste in the mouth; dimness of vision; bright spots before the eyes; palpitation; shooting or fixed pains in the region of the heart, and under the scapulæ, varying with the degree of flatulence, are occasional consequences of dyspepsia. In the more severe cases the

epigastric pain is considerable, and it is increased by pressure and by taking food. Sometimes the least food produces pain, and it is rejected as soon as it is swallowed, or after a short interval. Pain in the stomach (*gastralgia*) may be produced by flatulent distension from the generation of gas, by the presence of hard indigestible food, or of excess of acid. When the pylorus contracts upon masses of hard undigested food as it is passing into the intestines, violent crampy pain in the epigastrium is produced.

+ secretion of pepsin
+ stops fermentation
acid - epine bell
+ causes heat to pass
+ is a very common
cause of indigestion

CAUSES.—*Predisposing.* Debility; want of exercise; depressing passions; amenorrhœa; imperfect mastication; too short or too long intervals between meals; the frequent use of drastic purgatives; exercise immediately after taking food; diseases of the liver, pancreas, or spleen; the gouty diathesis. Dyspepsia is a frequent precursor of pulmonary consumption, and a common accompaniment of asthma and bronchitis. *Exciting.*—Inactivity of the liver, producing constipation; unwholesome and indigestible food; the habitual use of spirituous liquors; indulgence in too much wine at the dinner table; liquids in excess, especially hot tea and coffee.

DIAGNOSIS.—From ulcer of the stomach; by the absence of a fixed and limited seat of pain and of hæmatemesis.

TREATMENT.—*Indications.* I. To correct any bad habits into which the patient may have fallen, and to regulate the diet. II. To restore the mucous membrane of the stomach to a healthy condition. III. To palliate urgent symptoms.

I. The most important step to be taken in the cure of dyspepsia is to point out to the patient the necessity of changing such habits and pursuits as may have tended to give rise to the disease, and continue to aggravate it.

The habits which are most likely to require correction are the following:—Eating too much at one time; eating too often or too seldom; taking too great a variety of food at the same meal; drinking too much liquid before or with the meals; imperfect mastication of food; resuming bodily or mental occupation directly after eating; indolent and sedentary habits; the injudicious use of purgatives; drinking, smoking, chewing tobacco, opium-eating, and drinking tea and coffee in excess. If any particular article of food seem to disagree, it should be carefully avoided. Where there is much flatulence, vegetables and fruit will often be found to increase the disorder. Wine will sometimes require to be exchanged for weak brandy and water, or for brandy with soda-water, or Seltzer water; and common beer for the bitter beer or ale.

II. The second indication is fulfilled by inducing a regular action of the bowels by means of mild cholagogue purgatives. Stomachic tonics, such as gentian, calumba, cascarrilla, and cinchona, combined, according to the state of the secretions, with alkalies or the mineral acids, should be persevered in. Gr. v. of the compound rhubarb pill of the

Pharmacopœia may be given as a dinner-pill in mild cases of dyspepsia.

III. If there be much pain, half a dozen leeches or a mustard poultice must be applied to the epigastrium. *Acidi hydrocyanici diluti* ℥v., *tincturæ opii*, ℥v., given in a state of effervescence, with a few grains of carbonate of soda and citric acid, will generally allay the vomiting.

The diarrhœa will generally yield to a few doses of the *pulvis cretæ aromaticus cum opio*. An acute attack of indigestion is best treated by an emetic, followed by rest and a free aloetic purge.

ULCER OF THE STOMACH.

SYMPTOMS.—Pain in the pit of the stomach, referred to a small spot, coming on immediately or soon after taking food, and continuing for an hour or two, and then slowly abating as the stomach becomes empty. But in some cases it is felt even then. A circumscribed soreness is usually induced by pressure upon some part of the epigastrium. Circumscribed pain is also commonly felt in the corresponding part of the back. It is increased by indigestible food, hot fluids, and alcoholic liquids, and in young females by the approach of the menstrual period. There is nausea and vomiting of food, of a clear sour liquid, of bile, of blood. Sometimes the blood is discharged by the bowels. The bowels are generally constipated. The patient loses flesh, has an unhealthy aspect, and wears an expression of weariness and suffering.

Usually the disease causes very little constitutional disturbance, and in some cases the local symptoms are so slight, that severe hæmatemesis, or even perforation of the stomach may be the first indication we get of the existence of the disease. In some cases the process of ulceration is rapid, and perforation occurs within a few weeks (it may be) of the formation of the ulcer. In other cases the ulcer remains open for many years, giving rise to its ordinary symptoms, and now and then to an alarming hæmorrhage; and at last leads to perforation.”*

TERMINATIONS.—In recovery; in death by perforation (see Perforation); by hæmorrhage followed by fatal syncope, or prolonged collapse; by marasmus from constant vomiting.

CAUSES.—*Predisposing.* The female sex; privation; intemperance; fatigue; anxiety. *Exciting.*—Obscure.

The influence of age on the occurrence of gastric ulcer may be thus briefly stated:—From 16 to 20 years of age, 20 cases; for each decade from 20 to 60, about 50 cases; for the two decades from 60 to 80, about 80 cases; and for the 10 years from 80 to 90, 100 cases. “In this country it is supposed, and I believe rightly, to be most frequent in the class of maid-servants, between the age of 18 and that of 25.”*

* Dr. Budd on Diseases and Disorders of the Stomach.

DIAGNOSIS.—From *dyspepsia and subacute gastritis* by the limited pain on pressure in the epigastrium; by the pain in the back, by the more frequent vomiting, and by the discharge of blood; from *pyrosis and gastralgia* by the pain and discharge of sour liquid coming on in most cases sooner after food; from *cancer* of the stomach, by the shorter course of the latter, by the coexistence of cancer in other organs, by the marked cancerous diathesis, by the lancinating pain, by the presence of a hard and moveable tumour in the pit of the stomach, by the less abundant hæmorrhage, by the presence of microscopic cancer-cells in the matter rejected from the stomach. The diagnosis of ulcer of the stomach is often difficult and uncertain.

PROGNOSIS.—Favourable but guarded. Most guarded in cases of young females in whom perforation is a common event. About one in five cases may be expected to prove fatal in one of the ways mentioned above.

MORBID ANATOMY.—Open ulcers of the stomach are present in about 1 dead body in 10, and scars in the like proportion. In more than a third of the cases the ulcer occupies the posterior surface of the stomach; and more than three-fourths occur on the posterior surface, on the lesser curvature, or near the pylorus. In about one-fifth of the cases there is more than one ulcer; and the number may amount to two, three, four, five, or more. “The ulcer is rarely much smaller than a fourpenny-piece, or larger than a crown-piece;”* but it may attain a diameter of five or six inches. Its shape is usually round or oval, and it presents the appearance of “a shallow but level pit, with a sharp, smooth, vertical edge, as though it had been punched out;”* but as the circular opening in the sub-mucous areolar tissue is smaller, and the aperture in the peritoneum, if the ulcer perforate, still more minute, the ulcer has the appearance of a cone. The mucous membrane and the areolar tissue are somewhat thickened by exudation of lymph, and the surrounding mucous membrane is sometimes inflamed. Perforation takes place in about 1 case in 8; this result being often prevented by adhesion to the pancreas, liver, spleen, mesentery, or diaphragm.

In attributing death to ulceration of the stomach, it is important to be aware of the fact that, under certain circumstances, the coats of the stomach undergo *self-digestion*, resulting in pulpy or gelatinous softening, the formation of ragged ulcers, and, ultimately, perforation. The mucous membrane is converted into a thin, pasty mucous layer; the blood-vessels are blackened; subsequently all the coats of the stomach are removed, and a ragged aperture is made, through which the contents of the stomach pass into the peritoneal cavity. This self-digestion is effected by the action of the gastric juice. Hence it is met with in those who have died suddenly during digestion, and in those who have died from disease (such as phthisis), which, by chronic irritation of the pneumogastric nerve, had induced excessive secretion of gastric juice.

* Dr. Brinton on Ulcer of the Stomach.

TREATMENT.—*Indications.* I. To promote the healing of the ulcer. II. To counteract occasional symptoms. III. To improve the state of the constitution.

I. The first indication is fulfilled by a strict regulation of the diet, to the total exclusion of solid food, and the substitution for it of bland farinaceous food with milk. The food should be given in moderate quantities, at comparatively short intervals; and the return to the ordinary diet should be made slowly and cautiously. Spirituous liquors and hot fluids should be forbidden.

II. If there be much *tenderness on pressure*, counter-irritants, such as mustard poultices or blisters, should be used; if constant *pain*, opium may be given in the crude form, or as the compound soap pill; if *gastrodynia and pyrosis*, the nitrate of bismuth in doses of ten or twenty grains; if distressing *vomiting*, the dilute hydrocyanic acid in doses of from three to five drops three times a day; and farinaceous food in very small quantities often repeated; if *vomiting of blood*, small pieces of ice from time to time, and the remedies recommended under hæmatemesis; if *constipation*, castor-oil is the most suitable aperient; if *diarrhœa*, the compound kino powder in ten-grain doses.

III. If the patient be *anæmic*, the preparations of iron, of which the ammonio-citrate is most suitable. (In this disease it may be given dissolved in glycerine.) If there be much debility present, the citrate of iron and quinine in glycerine is to be preferred. In intemperate persons, full doses of opium are often required.

PERFORATION OF THE STOMACH.

SYMPTOMS.—After a longer or shorter duration of symptoms of ulcer of the stomach, intense pain in the epigastrium occurring suddenly, spreading rapidly over the whole of the abdomen, and soon followed by great tympanitic swelling and collapse. The disease assumes all the characters of peritonitis, and usually proves fatal in from twenty-four to thirty-six hours. In some cases the fatal event is postponed in consequence of the peritonitis being of limited extent, or sub-acute in character. In most cases the rupture takes place during the distension of the stomach by a full meal, but it is sometimes occasioned by vomiting, straining at stool, coughing, or sneezing; by pressure, shocks, or blows.

TERMINATIONS.—In acute peritonitis and death in from twenty-four to thirty-six hours; in chronic peritonitis, and death after a more considerable interval; in abscess of organs bordering on the stomach, and opening in various ways; in gastric fistula.

CAUSES.—*Predisposing.* Those of the gastric ulcer. Females from the fifteenth to the twentieth and from that to the twenty-fifth year are very liable to this affection. Males are less subject to this acci-

dent; and the liability is greatest, and nearly equal throughout, from twenty to sixty years of age. *Exciting*.—Gastric ulcer; carcinoma; irritant poisons.

DIAGNOSIS.—From peritonitis due to other causes by the suddenness and intensity of the pain.

PROGNOSIS.—In the highest degree unfavourable, especially when the perforation takes place after a full meal.

TREATMENT.—The patient should be placed in the recumbent posture in a state of perfect rest. A full dose of opium, in the form of extract, or the compound soap pill, should be administered at intervals of three or four hours. Complete abstinence from food must be enjoined, the patient being allowed merely to moisten the mouth from time to time. If the inflammation run high, leeches should be applied to the abdomen, followed by warm fomentations. After the lapse of several days, the lower bowel should be relieved by enemata, and nourishment may be supplied by the same channel; but purgatives by the mouth are contraindicated. Should the patient survive the immediate consequences of the rupture, milk and farinaceous food must be given by the spoonful at short intervals, and a return to the usual diet must be made by slow and cautious steps. When convalescent, castor-oil should be given as an aperient, if necessary.

CARCINOMA, OR CANCER, OF THE STOMACH.

SYMPTOMS.—In the early stage of the disease the symptoms are very obscure. They are usually those of dyspepsia (sub-acute gastritis). But, after a longer or shorter interval, during which the patient loses flesh, and obtains little or no relief from his dyspeptic symptoms, a circumscribed tumour is discovered in the epigastrium. At this stage of the disease, the symptoms are generally of a more marked character. The pain is described as burning, gnawing, or lancinating; and there are nausea; acid and fœtid eructations; with vomiting of ingesta, of mucus, of blood, or of a dark grumous or sour frothy matter; complete constipation, and retraction of the belly, which becomes hard and flat; great emaciation, and the hue and expression of countenance indicative of the cancerous diathesis.

When the cancer involves the pylorus, as is most frequently the case, the passage of food into the intestine is impeded; it accumulates in the stomach, and undergoes fermentative decomposition there, and the distension of the viscus is occasionally relieved by copious vomiting.

MORBID ANATOMY.—The disease may take the form of scirrhus, or of medullary or colloid cancer. But the most common form of the disease is that of scirrhus, and its most common seat the pylorus. The disease is identified by the discovery of the cancer-cells, (fig. 6, p. 90)

under the microscope. The stomach is generally contracted when the disease occupies the cardiac extremity; greatly expanded and hypertrophied when the pylorus is affected.

DIAGNOSIS.—The epigastric tumour; lancinating pain; constipation and retraction of the abdomen, the cachexy and emaciation; the persistent vomiting of decomposed food, and the rapid progress of the disease, all serve to mark out this disease from every other. Cancer rarely occurs before forty. The part of the stomach which is affected may be generally inferred from the symptoms. When the cardia is the seat of the disease, the pain and vomiting come on immediately after taking food; when the pylorus is attacked these symptoms come on later. If the cardiac orifice be implicated there will be an obstruction to the entrance of the food; if the pyloric orifice be involved there will be an obstruction to the exit of the chyme.

CAUSES.—*Predisposing.* The cancerous diathesis. *Exciting.*—Long-continued dyspepsia. All causes of inflammation or congestion of the stomach.

TREATMENT.—A bland and nourishing diet, such as new milk; milk thickened with arrow-root; the stronger soups thickened with arrow-root; jellies, and light farinaceous puddings; and tripe boiled in milk. The food should be taken frequently, and in very small quantities. Excessive acidity may be checked by combining lime-water with the milk, or by the use of bicarbonate of soda. Nutritive enemata should also be administered once or twice every day; and cod-liver oil may be rubbed into the abdomen. Leeches, to subdue occasional inflammation; narcotics and sedatives to allay pain; anodyne plasters, fomentations, and embrocations externally; and rest.

OTHER FORMS OF STOMACH DISORDER.

ATONY OF THE STOMACH—ATONIC DYSPEPSIA.

SYMPTOMS.—Insufficient appetite for food, and slowness of digestion, with occasionally pain of a severe crampy or spasmodic character some hours after food, due to the presence of undigested food and its passage through the pyloric orifice. Headache, flushing and heat of the face after meals, and other symptoms of dyspepsia are occasionally associated with this condition.

CAUSE.—Defective secretion of gastric fluid.

TREATMENT.—Brisk exercise and the avoidance of sedentary occupations and excessive mental labour and anxiety. A light nutritious diet, taken in small quantities and often. The use of salt, mustard, pepper, a pill composed of gr. v. each of mastich or myrrh and extract of rhubarb taken daily half an hour before dinner. Generally a

carminative tonic, such as $\mathfrak{z}\text{ij}$. of compound tincture of cardomoms with an ounce of infusion of calumba, or compound infusion of gentian, may be taken thrice a day with advantage. In many cases $\mathfrak{m}\text{xv}$. of dilute nitromuriatic acid, in combination with the above, is of much service. Small doses of ipecacuanha often do much good.

PYROSIS—WATER-BRASH.

SYMPTOMS.—In the morning or forenoon, when the stomach is empty, or some hours after a meal, and preceded by pain and a sense of constriction at the pit of the stomach; vomiting of a thin watery fluid, in considerable quantity, sometimes of an acid taste, but often quite insipid. The free discharge of the fluid generally gives relief to the pain, and puts an end to the attack. It may occur only occasionally, or persist with intermission for years. The quantity of fluid may vary from an ounce to a pint or more. It is rejected by a process of rumination rather than of vomiting, retching being usually absent.

CAUSES.—*Predisposing.* Middle age. The female sex. *Exciting.*—Reflex irritation of the abdominal and pelvic viscera, especially of the uterus. Hence the disease is a frequent concomitant of pregnancy. A poor and restricted diet.

TREATMENT.—Improve the diet, and avoid an undue proportion of farinaceous substances. If the liquor ejected from the stomach be highly acid, liquor potassæ, or carbonate of soda or magnesia may be combined with the other remedies. ($\mathfrak{R}$ Bismuthi albi gr. x. Acidi Hydrocyanici dil. $\mathfrak{m}\text{iii}$. Liq. Potassæ $\mathfrak{m}\text{xx}$. Mucil. acaciæ, Syrupi Tolut. $\mathfrak{aa}$ $\mathfrak{z}\text{ii}$. Aquæ $\mathfrak{z}\text{ss}$.) In other cases the vegetable astringents in combination with opium, such as gr. x. pulvis kino compositi, are of much service.

EXCESSIVE FORMATION OF LACTIC ACID IN THE STOMACH.

Symptoms and Treatment.—"This disorder is most common in nervous persons with feeble digestion, in whom it not unfrequently happens that acid collects in great quantities after meals. They often familiarly tell us that almost everything they eat turns to an acid."* Severe heartburn comes on soon after eating, and is occasionally relieved after two or three hours by vomiting of very sour fluid, the acidity being due to lactic acid produced by conversion of the starchy constituents of food into that compound. The alkalies give temporary relief. Permanent benefit may be derived from the mineral acids.

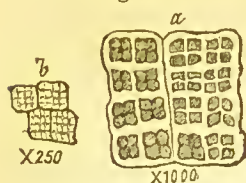
FORMATION OF ACETIC ACID BY FERMENTATION OF THE SACCHARINE CONSTITUENTS OF THE FOOD.

Symptoms and Treatment.—Heartburn (pain in the stomach and sour eructations) after meals; belching; and eventually vomiting of sour frothy fluid containing much acetic acid with or without a little alcohol,

* Dr. Budd on Diseases of the Stomach, p. 220.

are the symptoms of this disorder. Very frequently it is associated with the development of the peculiar vegetable organisms which have been called by Mr.

Fig. 66.



Goodsir *Sarcina ventriculi* (Fig. 66). The sarcinae are found in a brownish scum which forms on the surface of the vomited matters. They are often associated with the common yeast fungus, *Torula cerevisia* (Fig. 23, p. 147).

This form of stomach disease is often very obstinate, and it may continue, with greater or less severity, for years. Alkalies only give temporary relief. The fermentative process may be prevented by kreasote given in ii. or iii. ℥ doses in the form of pill, thrice a day. Sulphurous acid is a still more effectual remedy: it may be given in ʒss doses diluted with a little peppermint-water twice or thrice a day.

SYMPATHETIC VOMITING.

Causes.—Sympathetic disorder of the stomach resulting in vomiting may be produced by irritation of the brain, of the lungs, liver, intestines, kidneys and ureters, uterus and ovaries.

Cerebral and uterine irritation, in particular, are prone to induce sympathetic vomiting, as is well illustrated in concussion of the brain and in pregnancy.

When the irritation of a particular organ is prolonged then reflex vomiting may be a constant and distressing symptom. This frequently occurs in the latter stage of tubercular disease of the lungs; and the constant irritation reflected upon the stomach leads to the secretion of much sour fluid.

Treatment.—In all cases of reflex vomiting we must of course direct the treatment to the removal of the source of the irritation. In the vomiting associated with phthisis, the alkalies and subnitrate of bismuth, in combination with hydrocyanic acid and the vegetable astringents, are of much service.

In other cases, such as the passage of a gall-stone, large doses of opium, in the solid form, may be required to relieve the violent vomiting.

DISEASES OF THE INTESTINES.

ENTERITIS	Inflammation of the Intestines.
DYSENTERIA	Dysentery.
DIARRHŒA	Looseness of the Bowels.
MELÆNA	Hæmorrhage from the Bowels.
TORPOR INTESTINORUM	Constipation.
OBSTRUCTIO INTESTINORUM	Obstruction of the Bowels.
INTUS-SUSCEPTIO	Invagination of the Bowels.
COLICA	Colic.
COLICA PICTONUM	Painters' Colic.
TYMPANITES	Drum Belly.
HÆMORRHOIDES	Piles.

ENTERITIS.

DEFINITION.—Inflammation of the mucous membrane of the small intestine.

VARIETIES.—1. General and idiopathic. 2. More or less partial and specific.

1. GENERAL ENTERITIS.

SYNONYMS.—*Enteria. Enteritis erythemoidea. Diarrhœa mucosa, or catarrhosa.*

SYMPTOMS.—At first chilliness or slight rigor; nausea, and if the duodenum be especially affected, vomiting; thirst; a white furred tongue, with prominent fungiform papillæ, and a red tip; a sense of heat and soreness in the belly, but confined chiefly to the epigastrium and umbilicus; a dull diffused pain on making heavy pressure; frequent diarrhœa, which is usually the most prominent and troublesome symptom. The nature of the alvine discharges depends upon the cause of irritation. They are always fluid; at first they contain much undigested matter; subsequently they are chiefly composed of watery mucus, occasionally streaked with blood. After the diarrhœa has continued for some hours, the intestine is liable to become distended with flatus, producing gurgling and griping pain.

During the continuance of the symptoms there is anorexia; and if much fluid, or a small portion of solid food be taken, it either induces vomiting, or, after a time, produces griping pain and increased diarrhœa. Unless the patient be subjected to judicious treatment, these symptoms may continue for several days, or even for weeks, and his health becomes much impaired.

CAUSES.—Imperfect stomach digestion; the passage of vitiated or imperfectly formed chyme into the intestine. A vitiated condition of the bile. Drastic purgatives:—the symptoms of enteritis may be well studied in the effects produced by a large dose of jalap. Mineral poisons,

such as arsenic, antimony, and corrosive sublimate. Exposure to external cold, whereby congestion of the internal organs, especially of the *internal skin*, the mucous membranes, is induced.

TREATMENT.—Warmth to the external surface; rest, functional and mechanical, of the inflamed part, by quietude of body, and the ingestion of such food as shall undergo stomach digestion, or, if it be passed into the intestine, cannot irritate the inflamed surface. Eggs, milk, beef-tea, arrowroot, constitute such articles of diet. Milk arrowroot, mixed, if depression require it, with a little brandy, is generally the most appropriate food. The inflammation and its most prominent symptom, diarrhœa, will be relieved by the *mistura cretæ* in combination with $\mathfrak{M}$ v.-x. *tincturæ opii*, taken every two or three hours. If there be much sickness, the foregoing may be combined with $\mathfrak{M}$ v. *acidi hydrocyanici diluti*. $\mathfrak{Zj}$. *spiritûs chloroformi*, in combination with opium, may be given to relieve griping, and hot fomentations, or stimulant poultices, may be simultaneously applied to the abdomen. If the diarrhœa persist, and the evacuations be bloody, it will be necessary to administer mineral astringents; of these the most appropriate are *Acidum sulphuricum aromaticum*, *Cupri sulphas*, and *Plumbi acetas*.

2. PARTIAL ENTERITIS.

Partial enteritis is caused by specific inflammation of the glands of the small intestine. The solitary and agminated glands are invariably affected in enteric fever, the attendant symptoms are recorded at page 328. They also frequently become the seat of tubercular deposit, which ultimately induces local inflammation and subsequent ulceration. The symptoms of tubercular ulceration of the small intestine, generally speaking, are those of well-marked ulceration in enteric fever, viz., persistent purging, light-coloured watery stools, griping pain in the abdomen, gurgling and tenderness about the right iliac fossa. In both diseases hæmorrhage to an alarming extent is liable to occur. The general treatment is in both diseases alike (see Enteric Fever). The *bismuthum album* in x. or xx. grain doses, with $\mathfrak{M}$ v. dilute hydrocyanic acid, in combination with *tragacanth mucilage*, is very serviceable in the diarrhœa of phthisis.

MORBID ANATOMY.—Of the ulceration of enteric fever (see page 329). Of tubercular ulceration of the intestine:—Large patches of ulceration throughout the ileum, separated by intervals of four or six inches, commencing as small round discrete ulcers at the upper part of the canal, gradually becoming confluent below into large irregular patches extending around the whole circumference of the canal. From a description of a single ulcer the appearance of all may be inferred. Ulcer irregularly circular, limited by a thick and elevated rounded angry-looking border; within, the margin is irregular, and continuous with coarse angry-looking, more or less discrete, granulations, between which little yellow masses of tubercular deposit, firmly attached to the base of the ulcer, are here and there seen; the contiguous parts of the

intestinal wall much thickened, so that on spreading open the ulcerated bowel on a flat surface, the ulcerated patches form considerable elevations. Some of the ulcers extend quite down to the peritoneal coat. The position of the ulcers is known before opening the intestine by corresponding vascularity of the peritoneum, and a feeling of irregular thickening. The patient, upon whom the foregoing observations were made, suffered for some months with persistent and most intractable diarrhœa, and hectic, and became exceedingly emaciated. She subsequently exhibited rapid symptoms of tubercular degeneration of the left lung, which was found everywhere pervaded by tubercle, rotten, and in places actually broken down. (J. H.)

DYSENTERIA—DYSENTERY.

SYNONYMS.—Colitis. Bloody flux. The scourge of armies.

DEFINITION.—A specific inflammation of the mucous membrane of the colon, often traceable to marsh miasma, accompanied by tenesmus, and mucous, bloody, or purulent discharges.

SYMPTOMS.—The disease sometimes comes on with cold shiverings, followed by fever; at others, it sets in with bilious diarrhœa, which, after continuing for a few days, without causing much pain or uneasiness, becomes an incessant flux, with discharge of pure blood, of mucus, or of a white glairy matter, like white of egg, mixed with blood. Masses of indurated fæces are likewise sometimes passed by stool. At the same time, there are severe gripping pains in the abdomen; frequent inclination to go to stool; tenesmus; dysuria; and cramps in the thighs. The patient is restless, sleepless, and anxious, but the mind is unaffected, and there is no headache. The pulse is quick and hard, the tongue clean, the skin warm and moist, the face flushed, and the eye bright.

In this, the first stage of dysentery, the disease sometimes proves fatal, with symptoms of collapse; but it more commonly assumes the chronic form, the purging becomes persistent, pus and blood appear in variable quantity in the stools, which are semifluid and pultaceous, mixed with shreds of lymph, and exhale a most offensive putrid odour.

Under appropriate treatment the blood and pus disappear, the motions assume a more healthy condition, the diarrhœa decreases, and after some months the patient recovers. But recovery is in many cases very much protracted, and in many more it is incomplete, and the purging sets in again and again on exposure to cold, or after the ingestion of indigestible food. The patient preserves a good appetite, and does not lose flesh, but if, as is sometimes the case, the disease involve the small intestine also, emaciation, in proportion to the extent of the disease of the ileum, results.

COMPLICATIONS.—The disease may accompany, precede, or follow

ague, or remittent fever; and may be complicated with inflammation of the liver, spleen, or pancreas.

TERMINATIONS.—In incessant vomiting; in aphthous inflammation of the month; in abscess of the liver; in ascites; in fatal hæmorrhage; in perforation of the intestine; in gangrene; in collapse.

MORBID ANATOMY.—In the *acute stage*, the mucous membrane of the colon inflamed in patches of a deep-red colour, or throughout its whole extent; sometimes black, as if gangrenous; sometimes softened. The intestine itself contracted. The mucous follicles enlarged and transparent, or hard and opaque. In the *advanced stage* of the disease, ulcers of the large intestines, which commence, in the first instance, in the solitary glands, and thence spread and become confluent into small round ulcers, and subsequently into large ragged patches. The neighbouring tissues become much thickened. In some cases, similar appearances in the lower part of the small intestines, and occasionally even in the stomach. The mesenteric glands often red, swollen, and soft. The intestines contain, in the early stage, mucus, blood, and a watery lymph; in the advanced stages, pus mixed with blood.

In cases of long-standing disease the ulcers are found contracted and surrounded by tissue of almost cartilaginous hardness. Tough cicatrices mark the position of ulcers which have ultimately healed.

A large majority of the fatal cases of dysentery present abscess in the liver. The purulent deposits in this organ may be due to concomitant hepatitis, or, as Dr. Budd has suggested, the pus may be derived from the ulcerated intestine (see Pyæmia).

CAUSES.—*Predisposing*. A high temperature. Unwholesome food, especially salt meat and unripe fruit; fatigue, privation, and exposure. Intemperance. *Exciting*.—Marsh miasma; impure water; exposure to wet and cold, especially at night after a hot day. A debauch. A specific contagion.

DURATION.—From a few days to several weeks, months, or years.

MORTALITY.—In acute dysentery from 1 in 8 to 1 in 50; in chronic dysentery, from 1 in 4 to 1 in 6.

DIAGNOSIS.—From inflammation and ulceration of the small intestines; by the absence of anorexia, vomiting, and emaciation. From ordinary diarrhoea by the presence of sloughy membrane and pus, and by the persistence of the purging.

PROGNOSIS.—*Favourable*. The stools becoming yellow and less frequent; the strength little impaired; sediment in the urine. The patient coming under treatment at an early stage.

Unfavourable.—Violent and distressing tenesmus and tormina; vomiting; hiccup; aphthæ; difficult deglutition; convulsions; cold extremities; delirium; cold and partial sweats; the tongue preferentially red and dry; the pain suddenly ceasing; great prostration of strength; the motions extremely fetid; petechiæ; involuntary evacuation.

tions ; intermitting pulse ; the disease being complicated with or supervening upon others, such as affections of the liver, and intermittent or remittent fevers.

TREATMENT.—In the *acute stage*. The hot bath ; leeches to the anus or to the tender spots of the abdomen, followed by hot fomentations, turpentine 'stupes, or mustard 'poultices. Opium in the solid form, or Dover's powder, combined with small doses of calomel, blue pill, or hydrarg. $\bar{c}$ cretâ, to act upon the liver, may be given in full doses every one, two, or three hours, according to the severity of the symptoms, and followed at intervals by an ounce of castor-oil. Two or three ounces of starch, with half a drachm of laudanum, or a suppository of one or two grains of opium may, at the same time, be introduced into the rectum. The strength should be supported by light preparations of barley, rice, sago, arrowroot, flour, panada, and gelatinous broth ; but all solid food should be proscribed.

Local blood-letting is rarely required in this country ; a full dose of castor-oil, with ten or twenty drops of laudanum, and a regulated diet, being generally sufficient.

As the evidence bearing on the treatment of dysentery is very conflicting, it will perhaps be allowable to prescribe a treatment founded on the nature of the disease. The first object to be accomplished is the removal of the solid contents of the bowels by full and free doses of castor-oil combined with from $\mathfrak{m}$ xx.-xxx. of Tinct. Opii. Two or three such doses might be given with advantage, on two or three successive mornings. At the same time a diet should be prescribed free from solid ingredients, but more or less nourishing according to the state of the patient, with an allowance of port wine in cases of great debility. Tender spots in the abdomen should be treated with a few leeches, followed by warm fomentations : and tenesmus and dysuria by suppositories of the compound soap pill, or small injections of gruel, containing laudanum. From the favourable effect of nitrate of potash in doses of ten grains frequently repeated in a very troublesome and intractable form of diarrhœa, I should be disposed to recommend ten grains of this salt with a grain of opium and a grain of ipecacuanha three or four times a day. (G.)

Chronic dysentery is one of the most intractable of diseases ; and if we regard for a moment the pathological condition of the diseased intestine, we shall see the cause of this. Alterations in the calibre of the intestine and the passage of undigested food, or irritating fluids, are of themselves sufficient causes to prevent the ulcers from healing. The diet must therefore consist of such food as will leave no indigestible residue. It should chiefly consist of bread, eggs, and milk ; vegetables must be strictly prohibited.

The diarrhœa will only yield to the mineral astringents, of which sulphate of copper, in $\frac{1}{2}$ grain doses combined with $\frac{1}{4}$ of powdered opium, is the most effectual.

The bowels should be washed out every day with a cold-water clyster. (J. H.)

PROPHYLAXIS.—Warm and dry clothing; cleanliness; a mixed and wholesome diet; avoidance of exposure to wet, cold, and fatigue; prompt change of wet clothing. In the case of armies, a frequent change of the site of the camp.

REMEDIES.—Emetics; ipecacuanha in small and repeated doses; large doses of opium (xx. grs. in twenty-four hours); acetate of lead with opium; injections of iced water, turpentine; quinine; salicine (in five-grain doses); decoction of cusparia, combined with nitric acid and laudanum; strychnia. In chronic cases, injections of nitrate of silver, sulphate of copper, or acetate of lead.

DIARRHŒA—LOOSENESS, OR PURGING.

DEFINITION.—Frequent discharges of semi-solid, or fluid alvine evacuations, accompanied by symptoms, sometimes slight, sometimes severe, of gastro-intestinal irritation.

VARIETIES.—1. From the irritation of unwholesome or indigestible food. 2. From excessive secretion, or vitiated condition of the bile. 3. From increased mucous secretion. 4. From serous or watery exsudation. 5. Accompanied by fibrinous exsudation. 6. Sympathetic diarrhœa.

The *first form* is very common in the latter part of summer and in the autumn. It is produced by the ingestion of fruits. In this country, green peas and cucumbers are the most frequent cause of diarrhœa. The treatment consists in the removal of the offending matter by a full dose of castor-oil, combined, if there be much griping, with ℞x. or xv. of tincture of opium.

Bilious diarrhœa is very common in the European inhabitants of tropical climates. It is caused by use of a larger quantity of animal food than is required in hot climates, under which circumstances the diminished respiratory function is compensated by the elimination of the hydro-carbonaceous constituents of the bile in excessive quantities. (See Biliary Congestion.) The secretion is rapidly poured out into the duodenum, and sets up bilious diarrhœa.

The treatment consists: 1. In relieving the distended condition of the liver, by allowing the diarrhœa to continue unchecked for a time. If there be pain, gr xv.—xx. of bicarbonate of soda may be given in combination with ℞v.—x. of tincture of opium. 2. By adapting the diet to the altered conditions of existence, and substituting vegetable for animal food, and avoiding the use of spirituous liquors.

Mucous diarrhœa, or intestinal catarrh, is a common variety. It sometimes co-exists with, and sometimes follows upon catarrh of the bronchial mucous membrane. The slightest exposure to cold and damp will induce it in many delicate people. It is this form of diarrhœa which accompanies enteritis and the acute stage of dysentery.

The appropriate remedies are sulphuric acid, and the vegetable astrin-

gents, such as catechu and gallic acid, together with the general treatment recommended in enteritis.

Serous or watery diarrhœa often occurs spontaneously in ascites and general dropsy, in which conditions it appears to set in as a natural curative process. It is doubtless caused by the direct exsudation of the watery constituents of the blood from the congested mucous membrane. It should therefore be encouraged, and when excessive, only controlled by the vegetable astringents. This form of diarrhœa follows the administration of the hydragogue purgatives. Sometimes it alternates with profuse perspiration, as in colliquative diarrhœa. In Asiatic cholera it occurs to an intense degree.

Fibrinous diarrhœa is very rare. The fibrinous discharges resemble the membrane of croup, or of plastic bronchitis. It occurs in the form of shreds or tubular membranes. In the treatment of this variety the astringent mineral salts are very serviceable.

Sympathetic diarrhœa is well exemplified in the pregnant condition. In place of morning sickness, many women experience diarrhœa during the early months of pregnancy. It frequently occurs in children during teething. Emotional excitement will rapidly induce it in persons of the nervous temperament. In all cases it readily yields to *misturæ cretæ*, combined with a few drops of opium.

From the foregoing it will appear that there is no general treatment for diarrhœa; and before we apply our remedies we must, from the previous history, or from the nature of the evacuations, determine the precise cause, and treat accordingly.

CAUSES.—Cold applied to the surface; suppressed perspiration; mental emotions; pregnancy; teething; the heat of the summer and autumn seasons; indigestible food; unripe fruits, or ripe fruits in excess; putrid substances; the abuse of active purgatives; previous constipation; worms; retrocedent gout or rheumatism; phthisis pulmonalis; enteric fever. Diarrhœa is a frequent precursor of Asiatic cholera.

MELÆNA—HÆMORRHAGE OF THE BOWELS.

DEFINITION.—The discharge of dark-coloured, or more or less altered blood from the bowels.

CAUSES.—Melæna is symptomatic of the following diseases:—Diseases of the liver, heart, and lungs, obstructing the general venous and portal circulations (see *Hæmatemesis*, page 562); ulcer of the stomach, or duodenum; tubercular ulceration of the small intestine; enteric fever; dysentery; intussusception; rupture of an aneurismal sac into the bowel.

DIAGNOSIS.—From *hæmorrhoids* by the darker colour and larger quantity of the blood, and by the absence of soreness and tenesmus.

TREATMENT.—That of the condition producing it. (See the several diseases above enumerated.)

TORPOR INTESTINORUM—CONSTIPATION.

The causes of constipation are either structural or functional.

The *structural* causes either narrow the intestines or entirely obliterate the passage. In the one case, purgative medicines act, though with difficulty; in the other case, the mechanical impediment must be first removed.

Among the *functional* causes of constipation, are the absence of irritating matter from the diet, a deficiency of bile, want of proper exercise, spasmodic action of the muscular fibre, or paralysis of some part of the gut.

The *treatment* of constipation, due to alteration of function, will depend upon the character of that alteration. If the food be deficient in indigestible matter, we must supply it by brown bread or ripe fruits; if the bile be wanting, we must stimulate the secretions of the liver by mercurial preparations in small doses; if the habits be sedentary, we must enjoin proper exercise. The other functional disorders will be noticed under the head of Colic.

Habitual constipation is best treated by aloetic purgatives; by the compound rhubarb, or compound colocynth pill, with small doses of the extract of conium. When the torpor of the bowels is still greater, and especially where there is a large accumulation of hardened fæces, purgative enemata are required, consisting of gruel with castor-oil, oil of turpentine, or Epsom salts. If the enemata return without bringing any scybalous matter away, a large quantity of warm water, or of air, should be injected through a long flexible tube introduced into the sigmoid flexure of the colon.

A stream of cold water poured from a height on the abdomen has sometimes relieved obstinate constipation. When the stomach is irritable, croton oil may be rubbed into the skin of the abdomen or inside of the thigh.

The management of constipation alternating with diarrhœa requires some care. When diarrhœa is present, purgatives should be omitted, and not be resumed till it has ceased. This caution is especially necessary in nervous diseases; for these diseases are as much relieved by gentle aperients as they are increased by hypercatharsis.

OBSTRUCTION OF THE BOWELS.

It sometimes happens that all our remedies fail to produce action of the bowels. If in such a case there be tenderness in any particular part of the abdomen, accompanied by vomiting, we may be sure that there is some obstruction, more or less complete, to the passage of fecal matter, and it becomes a matter of the most urgent necessity to ascertain the cause and situation of the obstruction. The causes of obstruction are as follows:—

1. Strangulation or incarceration of a portion of intestine: a small knuckle of intestine may, after careful examination, be found at the femoral opening, or in the scrotum or labium, and no other symptom of

hernia but constipation be present. The strangulation may be internal, and caused either by intussusception, or by the entanglement of a portion of intestine in some band of the mesentery or old adhesion.

2. Fæcal accumulations, forming large, hard, dry masses, filling up the cells of the colon. Fæcal matter is liable to accumulate around biliary calculi, plum-stones and other foreign bodies. Externally these accumulations have the characters of a hard, irregular tumour, which may be mistaken for adventitious growths. Fæcal accumulations are very apt to form in the cæcum around a cherry-stone, or other mass of indigestible matter, arrested in this part of the canal. Such accumulations often set up violent inflammation, accompanied by symptoms of complete obstruction. If the inflammatory symptoms be not subdued, pelvic abscess and perforation is very liable to result. The inflamed cæcum sometimes becomes adherent to the anterior abdominal wall, where the abscess may point, and finally pus and fæcal matter be discharged through an opening which communicates with the interior of the intestine.

3. Cancerous growths, chiefly of the rectum; and the contraction attending the cicatrization of ulcers of the bowel, are other causes of obstruction.

TREATMENT.—Reduce the hernia, and give a copious clyster of gruel. If the strangulation be internal, and the symptoms severe, a careful diagnosis of the exact seat of strangulation should be made, and the abdomen should be opened without delay and the bowel disengaged. If the obstruction be due to accumulation in the cæcum and large intestines, large castor-oil or soap enemata should be freely employed, and hot fomentations simultaneously applied to the abdomen. If there be symptoms of inflammation, leeches must be freely applied over the inflamed part. The vomiting may be allayed by iced soda-water, and the pain by large doses of opium. When the scybala reach the rectum, it is often necessary to facilitate their discharge by means of a forceps or scoop. In cases of unrelieved obstruction, perforation is liable to occur.

The symptoms and treatment of **PERFORATION OF THE INTESTINES** are the same as those of the stomach. (See page 568.)

INTUS-SUSCEPTIO—INVAGINATION.

SYMPTOMS.—During violent action of strong purgatives, or after severe colic, a constant desire to go to stool, violent tormina and tenesmus, discharge of blood or of a small quantity of bloody mucus and the symptoms of enteritis. These symptoms are not decisive; but the existence of the disease becomes more probable after the failure of attempts to evacuate the bowels, and the supervention of hiccup and stercoraceous vomiting.

MORBID ANATOMY.—One portion (from a few lines to more than a foot in length) of the intestines enclosed within another. In

most cases there is only one of these invaginations, but in some instances there are several. The most common seat of the obstruction is the junction of the small with the large intestines; but it may take place in any part of the small intestines, and in the arch of the colon. A natural cure is sometimes effected by adhesion, suppuration, gangrene, and separation of the enclosed portion of intestine, the presence of which may be looked for in the stools.

DIAGNOSIS.—Symptoms of obstruction of the bowels occurring suddenly, and followed by a perceptible tumour in the abdomen, and the passage of blood, would give reason for suspecting the existence of this disease. The discovery of a portion of the intestinal tube in the evacuations from the bowels would furnish conclusive evidence.

PROGNOSIS.—Very unfavourable. In a few cases relief is given by remedies, and in a few cases also recovery takes place after sloughing of the constricted portion of intestine.

TREATMENT.—*Indications.* 1. To subdue any existing inflammation. 2. To palliate the sickness and pain. 3. To remove the obstruction.

I. If there be decided tenderness in any part of the abdomen, leeches must be applied to the tender spot, followed by warm poultices, or hot fomentations.

II. The distressing vomiting which accompanies obstruction of the bowels is best relieved by iced soda-water. Opium in the solid form, or the tincture, should also be given at short intervals, with a view of moderating the pain and controlling the disordered peristaltic action.

III. With the view of relieving the obstruction, a large quantity of warm water should at intervals be thrown up into the bowels by the long elastic tube. Should this fail, a further attempt at removing the obstruction should be made by injecting air. This treatment may be repeated at intervals, till the bowels are relieved, or till the attempt to obtain relief in this way seems hopeless. After the failure of all these attempts, the mechanical remedies recommended for removing the obstruction may be resorted to; or an operation may be performed, the sac of the peritonem being opened, and the intestine unravelled.

REMEDIES.—Crude mercury (from one to three pounds) swallowed. Small shot administered in the same way. Tobacco injections.

COLICA—COLIC.

DEFINITION.—Painful contraction of the muscular coat of the intestines, from disordered peristaltic action, caused by the presence of hard solid matter or air in the intestines.

SYMPTOMS.—Severe shifting pain in the abdomen of a twisting character, occurring in paroxysms, and accompanied with retraction of

the umbilicus. The pain is relieved by pressure; there is generally much flatulence; the pulse little increased in frequency.

CAUSES.—The presence of undigested hard substances, such as unripe fruit and uncooked vegetables in the intestines; hardened fæces (*scybala*), or other accumulations; flatulent distension; obstruction of some part of the intestinal canal from impaction of fæces, stricture or strangulation; certain metallic poisons, *e.g.*, lead; worms.

DIAGNOSIS.—From *peritonitis*, by the peculiar twisting pain and retraction of the navel; by the absence of fever; and by the pain being alleviated by pressure. From muscular pains of the abdomen by the effect of percussion with the points of the fingers. This produces sudden and severe pain when the muscles are affected, but not in colic. In muscular pain, too, the sudden removal of pressure causes acute suffering.

TREATMENT.—Having ascertained that there is no concomitant inflammation, and no mechanical obstruction which can be detected—and, at the same time, that the pain is not merely muscular—the bowels, if there have been defective action, should be freely relieved by a full dose of purgative medicine, such as $\mathfrak{f}\mathfrak{z}\mathfrak{j}$. Olei ricini alone or in combination with $\mathfrak{m}\mathfrak{x}$. to $\mathfrak{m}\mathfrak{xv}$. Tincturæ opii.

If the colic be due merely to flatulent distension $\mathfrak{z}\mathfrak{j}$. Spiritus chloroformi in combination with $\mathfrak{f}\mathfrak{z}\mathfrak{ss}$ Tincturæ rhei compositæ and $\mathfrak{m}\mathfrak{x}$. Tincturæ opii, may be given.

If there be any symptoms of obstruction we must carefully avoid active purgatives, and trust to the effect of enemata: a large clyster of thin gruel containing a drachm of the tincture of opium may be thrown up, either by means of the common clyster-pipe or through the flexible tube. Should the bowels still continue unrelieved, and there are still no symptoms of inflammation, the patient should be kept under the influence of opium till a free evacuation takes place. The pain may in the mean time be relieved by fomenting the abdomen with flannels wrung out of hot water or the poppy fomentation; or by steady pressure.

It is not unusual in cases of colic to find, on inquiry, that one of the first symptoms was the discharge of a quantity of gelatinous mucus from the bowels. In such cases there is commonly more or less tenderness in some part of the abdomen, especially in the right iliac fossa, and from six to twelve leeches, followed by a warm bread-and-water poultice, should be applied to the tender spot. (G.)

Flatulence may be relieved by the introduction of the long flexible tube, which may also be advantageously employed to throw up warm water into the bowels.

In spite of the persevering employment of these means, six or seven days will sometimes elapse before the bowels can be made to act.

COLICA PICTONUM—LEAD COLIC.

SYNONYMS.—Colic of Poictou. Painters' colic. Saturnine colic. Devonshire colic.

SYMPTOMS.—Those of colic from other causes, the pain generally coming on more gradually, and being often accompanied with pains in the limbs, or with weakness, or complete paralysis of the hands or forearms. The abdomen is more frequently retracted than distended.

DIAGNOSIS.—From common colic, by the history of the case and the employment of the patient; and generally by the blue line at the margin of the gums indicating the action of lead on the system.

PROGNOSIS.—Favourable. Five fatal cases in 500. (Andral.)

TREATMENT.— $\mathfrak{Ji}$.^{*} *Magnesiae sulphatis* combined with $\mathfrak{m}\mathfrak{x}$. *Tincturæ opii* and $\mathfrak{f}\mathfrak{z}\mathfrak{j}$. *Infusi rosæ acidi* every four hours. Enemata of warm water, thrown up by means of the long flexible tube, with hot fomentations or the warm bath.

PROPHYLAXIS. (See Lead Palsy, p. 449.)

TYMPANITES—DRUM BELLY.

SYNONYM.—Meteorismus.

SYMPTOMS.—The abdomen distended, tense, elastic, and painful, and sounding, on percussion, like a drum or bladder filled with air. The air is, in almost all cases, contained in the stomach and intestines, its most common seat being the arch and sigmoid flexure of the colon. In very rare instances air passes into the sac of the peritoneum, in consequence of ulceration of the bowels. Tympanites is a painful symptom in severe cases of enteric fever, and in the latter stages of peritonitis.

CAUSES.—Loss of tone in the intestinal canal; errors in diet; excessive use of purgatives; abuse of warm liquids and of spirituous liquors; a crude vegetable diet; hysteria.

DIAGNOSIS.—From *ascites*, by the clear sound, and the absence of fluctuation on percussion.

TREATMENT.—In mild cases of flatulent distension of the bowels, the remedies usually resorted to are essence of ginger with hot water, or brandy and water swallowed as hot as it can be readily borne. In severe cases large doses of opium with $\mathfrak{z}\mathfrak{j}$. of spirit of chloroform, or $\mathfrak{iii}$.— $\mathfrak{v}$. drops of cajeput oil may be necessary. If the distension be very great it may often be relieved by the passage of a long and wide elastic tube

* $\mathfrak{Ji}$. = 100 grains.

into the bowel. Turpentine and assafoetida injections often give great relief.

Persons subject to tympanites should carefully avoid the use of food known to occasion flatulence.

HÆMORRHOIDES—THE PILES.

VARIETIES. 1. External. 2. Internal.

1. EXTERNAL PILES.

DEFINITION.—Small round tumours, situated at the verge of the anus, and covered with skin or mucous membrane, or painful folds of integument. The tumours either discharge blood, when they are called *bleeding piles*, or they do not bleed, when they are called *blind piles*. When free from pain they are called *indolent*.

SYMPTOMS.—When piles are in an inflamed state they occasion heat, itching, and pain, with a sense of weight and tension, increased upon going to stool, which generally occasions a discharge of blood. The inflammation sometimes runs on to suppuration. In mild cases piles appear and disappear, and are often absent for long periods of time.

2. INTERNAL PILES.

SYMPTOMS.—A sensation as of a foreign body in the rectum, with frequent desire to relieve the bowels, and painful strainings, accompanied by discharges of blood. In the more severe cases, dysuria, pain in the back and down the thighs, and, in females, uterine irritation.

CAUSES.—Luxurious and sedentary habits; habitual costiveness; plethora; hard riding; excesses of various kinds; the suppression of some long-accustomed evacuation; the habitual use of strong aloetic purgatives; pressure of the abdominal viscera on the hæmorrhoidal veins; pregnancy.

DIAGNOSIS.—From fissure of the anus by the appearance on inspection.

PROGNOSIS.—The discharge of blood by piles is often salutary, especially in persons advanced in life, and their suppression may be followed by apoplexy, or by more serious hæmorrhage from other parts.

TREATMENT.—The treatment of piles is—I. General. II. Local.

I. Of the general treatment the indications are—*a.* To promote the circulation of blood through the abdominal vessels. *b.* To keep the bowels free.

a. The first indication is fulfilled by the avoidance of sedentary habits, by active exercise, and by abstemious living.

b. The bowels to be kept free by gentle aperients, such as the senna,

or sulphur electuary, rhubarb and magnesia, the compound rhubarb pill, or small doses of blue pill, followed occasionally by castor-oil. A tea-spoonful of the confectio piperis may be given three times a day.

II. The *local* treatment consists in the strict observance of cleanliness, washing with cold water after each motion, and the careful return of the piles, if, being internal, they protrude during the evacuation of the bowels; in the use of astringent washes or ointments (such as the liq. plumbi subacetat., the unguentum gallæ eum opio, or an ointment consisting of pulv. Hellebori nigri ℞ss.* to ʒi. of lard); and when the piles are inflamed, in the application of leeches, followed by cooling lotions.

Bleeding piles also require the use of cold astringent applications and injections. Daily injections of cold water are highly beneficial. When the hæmorrhage is profuse, astringents may be given internally. The best is the acetate of lead with an excess of acetic acid and opium. The hæmorrhage, when very profuse, must be treated by astringent injections of alum and tannic acid.

Piles, strangulated by the spasm of the sphincter ani, must be compressed with the finger and passed into the rectum; the operation being facilitated by the use of the warm bath. A T bandage may become necessary.

When the tumours become chronic they should be removed.

PROPHYLAXIS.—Patients affected with piles should sleep on a hair mattress, sit as little as possible, and if sedentary or literary, pursue their avocations in an erect posture.

DISEASES OF THE STOMACH AND INTESTINES.

GASTRO-ENTERITIS MUCOSA	. English Cholera.
CHOLERA MALIGNA	Malignant Cholera.

GASTRO-ENTERITIS MUCOSA—ENGLISH CHOLERA.

SYMPTOMS.—Nausea, pain, and distension of the stomach and intestines, succeeded by vomiting, and by purging of bilious or feculent matter, and, when this has been discharged, of mucus. The tongue is furred; the pulse is frequent, small, and sometimes unequal; and there is much thirst. In rare cases death takes place within the space of twenty-four hours, after hiccup, cold sweats, great anxiety, blueness of the surface, and painful cramps of the extremities.

CAUSES.—Excessive heat, or sudden transitions from heat to cold; the summer and autumnal seasons; food of difficult digestion; unripe fruit, or an excessive quantity of ripe fruit; putrid meat; decayed vegetables; violent purgatives; irritant poisons; eatarrh.

DIAGNOSIS.—From enteritis by the coexistence of gastric symptoms.

* ʒi. = 100 grains.

The disease in its most severe form is indistinguishable from Asiatic cholera.

PROGNOSIS.—*Favourable.* A gradual diminution of the symptoms, especially of the vomiting, succeeded by sleep, or a gentle moisture on the skin. The disease, when protracted to the third or fourth day, seldom proves fatal. *Unfavourable.*—Painful cramps of the extremities; convulsions; great prostration of strength; cold, clammy sweats; anxiety; great distension of the abdomen; short hurried respiration; continual hiccup; intermitting pulse.

TREATMENT.—A restriction of the diet to farinaceous substances, to the entire exclusion of solid food, is generally sufficient to effect a cure. A scruple of the compound chalk and opium powder, or a mucilaginous mixture, with twenty drops of tincture of hyoscyamus, may be given at the same time, three or four times a day. When there is great prostration of strength, full doses of opium, with stimulants, are indicated, with warmth to the surface, and mustard sinapisms to the extremities.

When the disease has subsided, the usual diet must be gradually resumed, and a course of tonic medicines may be prescribed.

CHOLERA MALIGNA—MALIGNANT CHOLERA.

SYNONYMS.—Cholera morbus; epidemic, spasmodic, Indian, Asiatic, blue, and pestilential cholera. *Cholerine*—a term applied to the milder forms of the disease. *Cholera asphyxia*—a term used to characterise the state of collapse in fatal cases.

DEFINITION.—An epidemic malady due to an atmospheric poison, but communicable by infection, characterised by symptoms of collapse allied to asphyxia, and by profuse vomiting and purging.

SYMPTOMS.—The disease does not always begin in the same way. In a few cases it makes its attack suddenly: the patient vomits once or twice, or passes one or two loose motions, complains of giddiness, blindness, or deafness, falls down, and expires in a few minutes. In another and larger class of cases the disease shows itself after two or three days of slight indisposition, with depression of spirits, loss of appetite, oppression at the præcordia, rumbling in the bowels, giddiness, noises in the ears, and twitchings in the limbs. In a still larger class of cases the fully-formed disease sets in after a preliminary attack of diarrhœa of some hours' or days' continuance. The first class of cases is rarely seen out of India.

In the majority of cases, both in India and in this country, the following is the order of the symptoms: after a preliminary attack of diarrhœa, of greater or less severity, and continuing for some hours or days, the patient is seized with symptoms of collapse, accompanied, in most cases, by vomiting. The acts of vomiting and purging are gene-

rally unattended by pain or tenderness in the abdomen ; and the matters rejected from the stomach and bowels are free from bile, have a faint fishy odour, or are altogether inodorous, and resemble yeast, or they consist of a thin colourless serum, or they bear a close resemblance to rice-water, and are familiarly known as "rice-water evacuations." Sometimes they have a pink colour, or the deeper hue of port wine. Severe and painful cramps commence in the fingers and toes, and rapidly extend to the calves of the legs, to the thighs, and muscles of the abdomen ; the eyes are sunken, and surrounded by a dark circle ; the features contracted and sharpened ; the expression of countenance indifferent and apathetic ; the face, extremities, and sometimes the whole surface of the body, assume a leaden, bluish, or purple hue ; the limbs are shrunk and contracted ; the nails blue ; the hands clammy and sodden ; the surface covered with a profuse cold sweat ; the pulse thready or imperceptible at the wrist, arm, axilla, temple, or neck ; and if a vein or artery be opened, the blood trickles away, thick and dark. In spite of the extreme coldness of the surface, the patient complains of heat, throws off the bedclothes, and suffers from great restlessness and incessant jactitation, complains of a burning heat in the epigastrium, and is tormented with thirst ; the respirations are below the number in health, the inspiration difficult, and the expiration short and convulsive ; the voice is plaintive, the patient speaking in a hoarse, sepulchral whisper ; the breath feels cold as it issues from the mouth ; the tongue is white, or of a leaden colour, cold and flabby ; the temperature often as low as 79° or 77° , and even 72° . The secretion of urine is entirely suppressed, or a small quantity of limpid urine is passed, and there is an earthy or cadaverous odour exhaled by the body. In this state of collapse the disease often proves fatal, the patient dying without a struggle, and retaining his faculties to the last. In other cases he gradually rallies, the pulse rises, the blueness of the surface disappears, the body resumes its warmth, the cramps and vomiting cease, bile appears in the motions, the secretion of urine is restored, and a rapid and complete recovery takes place. But in a third class of cases the improvement is partial and temporary, and the patient falls into a state of fever closely resembling the typhous stage of continued fever, from which he may recover after several days, but which more frequently proves fatal.

TERMINATIONS.—In sudden death ; in death after severe primary or secondary symptoms ; in recovery ; in prolonged gastric irritation ; in secondary fever, of the typhous character, and often accompanied by a rash resembling *urticaria febrilis*.

PATHOLOGY AND MORBID ANATOMY.—The disease appears to consist in a sudden rejection of the fluid parts of the blood through the mucous membrane of the alimentary canal ; the intestines are filled with a white flaky liquid ; the mucous membrane swollen, and greatly congested in patches ; all the glands of the intestines large and prominent ; the veins and arteries loaded with dark blood ; the lungs congested in some cases, extremely contracted in others ; the

liver and gall-bladder gorged with bile; the kidneys congested; the urinary bladder strongly contracted and empty. In patients who survive the stage of collapse, and die after the secondary fever, the morbid appearances are those present in cases of typhus.

DURATION.—In fatal cases, from a few minutes to twelve hours or more. More than half the fatal cases die within the first twenty-four hours, and nearly a sixth within six hours. The average duration is about two days. The duration of the cold stage varies from a few minutes to forty-eight hours or more, while that of the febrile stage may extend from four to ten days or more.

MORTALITY.—At the onset of the epidemic nine-tenths of the cases; on the average about one-half; at the decline a small fraction. Deaths from cholera in England and Wales, in 1831-32, 30,924; in 1848-49, 54,398; in 1853-54, 24,516. Deaths in London, in a million of inhabitants, 6,209 in 1849, and 4,269 in 1854.

CAUSES.—*Predisposing.* Debility; impaired health; intemperance; impure air; impure water; low and damp situations; the summer and autumn seasons. *Exciting.*—A peculiar poison diffused through the atmosphere. There is also reason to believe that the disease spreads by contagion (though the contagion is not so intense as to cause anxiety among the attendants on the sick); and by means of water polluted by cholera-evacuations.

DIAGNOSIS.—From *English cholera*, by the absence of bile from the matters rejected from the stomach and bowels, which resemble rice-water, and have a peculiar odour; by the early occurrence and intense degree of collapse, and by the great mortality. The complete suppression of urine, the intense blueness of the surface, the hoarse, feeble voice, and the shrunken appearance of the countenance, are other diagnostic signs of this disease. But these marks will not serve to distinguish the disease from the more severe cases of English cholera. The diarrhoea, which forms the premonitory symptom of cholera, is distinguished from ordinary diarrhoea by the absence of pain.

PROGNOSIS.—*Favourable* in the early stage before collapse has set in, and in the secondary stage when the febrile symptoms are slight, and the type of the fever remittent or intermittent; *unfavourable* during the stage of collapse, and in the secondary fever when it assumes the typhous character. *Favourable Symptoms.*—Cessation of cramp; subsidence of vomiting and purging, and the reappearance of bile in the motions; voiding of urine; return of the pulse; restoration of heat in the extremities and surface of the body; disappearance of the blueness of the skin and of the facies Hippocratica. *Unfavourable Symptoms.*—Extreme collapse; absence or cessation of vomiting and purging in the stage of collapse; deafness; the evacuations of the colour of port wine. Advanced age, previous debility, or ill health, and previous habits of intemperance, are unfavourable circumstances, and the disease is somewhat more fatal in females than in males.

TREATMENT.—I. Of the preliminary diarrhœa. II. Of the stage of collapse. III. Of the stage of reaction.

I. The preliminary diarrhœa requires the treatment of common diarrhœa. In the ordinary run of cases, a scruple of the compound chalk and opium powder may be given three or four times a day, the diet being at the same time restricted to gruel or arrow-root, made with milk. In more severe cases, grain-doses of opium, in combination with $\frac{1}{2}$ grain of sulphate of copper, may be given every hour, or every two or three hours. Where the patient is in a weak and exhausted state, brandy may be administered from time to time. In epidemics of Asiatic cholera, patients suffering from diarrhœa should be promptly treated and carefully watched.

II. The stage of collapse is best treated by large draughts of salt and water (in the proportion of three table-spoonfuls of common salt to a quart of water), repeated every quarter of an hour till reaction is established. A scruple of chlorate of potash might perhaps be advantageously added to each quart of the solution. At the same time reaction should be promoted by warm blankets, bottles of hot water to the feet and epigastrium, and assiduous friction. The patient may be allowed to drink freely of warm brandy and water. The cramps may be relieved by forcible extension of the parts affected. The treatment by castor-oil, in the dose of a table-spoonful repeated at short intervals, so as to act both as an emetic and purgative, may be substituted for the treatment by emetics.

III. Reaction having been established, the treatment must be guided by the symptoms actually present. The thirst may be assuaged by large draughts of water; diarrhœa, if it exist, may be met by opium in doses of one grain, repeated at short intervals, or by a strong decoction of logwood in combination with laudanum and aromatic spirit of ammonia; and the warmth of the skin may be kept up by frictions and warm applications. In the absence of diarrhœa, the bowels should be relieved by occasional doses of castor-oil.

If the reaction be excessive, and assume the form of fever, it must be treated as common continued fever; and if it assume the typhous type, by the remedies appropriate to that condition.

PROPHYLAXIS.—Temperate habits; the observance of the rules of health; the moderate use of wholesome vegetables and ripe fruits; the early treatment of diarrhœa; and the use of tonics or other medicines adapted to the existing state of system in persons complaining of indisposition when cholera is prevailing. Those persons who are able to do so, should remove from low-lying districts to high grounds. Strangers should avoid visiting infected places. Persons supplied with drinking water from sources of doubtful purity should drink only water which has been previously boiled. On the approach of cholera, the authorities should cause visits to be made from house to house in search of cases of diarrhœa, and should make arrangements for the prompt treatment of such cases. They should also adopt measures for insuring personal and household cleanliness; for the early removal of

all refuse matters; for the suppression of nuisances; and for a sufficient supply of wholesome food and pure water. Armies attacked by cholera in low situations should be encamped on high ground, and draw their supply of water from pure springs or rivulets.

REMEDIES.—Castor-oil, in the dose of a table-spoonful repeated at short intervals, so as “to produce vomiting and purging sufficient to insure, from time to time, the evacuation of the stomach and intestines, and to prevent the accumulation of morbid secretions,” as practised by Dr. George Johnson. This mode of treatment, though not recommended by such numerical returns as have been hitherto published, seems to have had a good measure of success when carried out in its simplicity under the careful control of Dr. Johnson. Warm and hot-air baths; frictions with every form of stimulating liniment; internal stimulants, as in the last stage of fever. Saline medicines (Sodæ bicarb. gr. xxx. Sodii chloridi gr. xx. Potassæ chloratis gr. vii.); injections of warm water and of warm saline solutions (Sodii chloridii ζ ss, Sodæ bicarb. $\mathfrak{J}$ i.,* Aquæ callidæ Ox.) into the veins (a mode of treatment followed by the most prompt and marked relief to all the symptoms, but not to be commended as curing cholera); transfusion of blood; inhalation of oxygen gas; calomel, in scruple or half-drachm doses every hour; cajeput-oil; galvanism; large doses of opiates; strychnine; acetate of lead in combination with opium. A drachm of laudanum and a scruple of calomel administered at the first seizure, and repeated at a short interval, if necessary; chloroform; chloroform and brandy; quinine in large doses; Indian hemp; terchloride of carbon.

DISEASES OF THE PERITONEUM.

PERITONITIS . . . Inflammation of the Peritoneum.
ASCITES . . . Dropsy of the Belly.

PERITONITIS—INFLAMMATION OF THE PERITONEUM.

VARIETIES.—1. Simple. 2. Tubercular.

1. SIMPLE PERITONITIS.

SYMPTOMS.—After rigors, but, in some cases, without any preliminary symptoms, pain commencing in any part of the abdomen, and soon extending over the entire cavity, increased by pressure, and often so acute that even the weight of the bed-clothes is intolerable. The skin of the abdomen is hot; the pulse is in general small, hard, and contracted, though sometimes full and soft; the countenance is expressive of great suffering; the patient lies on his back with the thighs drawn upwards, and flexed on the abdomen; the bowels are constipated; the urine scanty and high-coloured; the tongue is white and

* $\mathfrak{J}$ i. = 100 grains.

covered with mucus, and soon becomes dry and brown, its edges and tip being red; the respiration is difficult, particularly during inspiration, and is chiefly performed by the ribs, as the diaphragm and abdominal muscles cannot act without increasing the pain. Nausea and vomiting are frequently present, and stranguary sometimes. When the disease advances without control, it often terminates fatally within twenty-four or forty-eight hours. Death occurs by asthenia, and is preceded by great prostration of the vital powers, sudden cessation of pain, sharpened countenance, distension of the abdomen by liquid or gas, vomiting of a coffee-coloured fluid, cold extremities, and stupor.

MORBID APPEARANCES.—Injection of the vessels of the peritoneum; coagulable lymph spread over the surface, or flakes of lymph floating in serum or pus; the folds of the intestines adherent by coagulable lymph to each other and to the contiguous viscera. In chronic cases the adhesions are organized, binding the intestines so firmly together as to greatly hinder peristaltic movement.

CAUSES.—Exposure to cold and fatigue; constipation; contusions, wounds, surgical operations; parturition; rupture of any of the abdominal viscera.

PROGNOSIS.—*Favourable*, in peritonitis from common and transient causes. *Unfavourable*, in that produced by mechanical injury, organic disease, parturition, or rupture of the abdominal viscera.

DIAGNOSIS.—From *rheumatism* or *neuralgic pains* of the abdominal muscles, by the pain being increased by pressure, and by the presence of severe constitutional symptoms. From colic, by the character of the pain. (See Colic, p. 583.) In colic the patient writhes about and changes his position. In peritonitis even the abdominal respiratory movements are avoided. From ovarian inflammation (see Oophoritis). From hysterical tenderness and pain, by the absence of the characteristic severe constitutional symptoms. The disease, in its early stage, may be distinguished by a feeling of crepitation under the hand, and a *to-and-fro* sound on applying the stethoscope while the abdominal parietes are in motion, as in the act of inspiration.

TREATMENT.—In recent and acute cases bleeding from the arm, followed by leeches and warm fomentations, and the internal use of tartar-emetic combined with calomel and opium in full doses, and at short intervals, so as speedily to affect the system. In very severe cases, mercurial inunction may be employed at the same time. If the stomach be irritable, the tartar-emetic must be omitted. In less severe cases, leeches to the abdomen, followed by warm fomentations, and calomel and opium internally.

After repeated doses of calomel and opium, castor-oil may be given in a half-ounce or ounce dose, and the large intestines may be relieved by enemata of warm water or warm gruel.

If there be painful tympanites, turpentine enemata are required, or

the long elastic tube may be introduced so as to allow the accumulated gas to escape.

When effusion has taken place, and the febrile symptoms have abated, the treatment will be that of ascites.

Chronic peritonitis must be treated by the repeated application of leeches, blisters, and stimulant embrocations to the abdomen. If the intestines become adherent from organization of the plastic lymph thrown out around them, obstinate constipation is the result. The intestines being firmly bound together are no longer able to perform their peristaltic movements. Such cases require very careful treatment. No indigestible matter must be taken, but only such food as is readily absorbed. The constipation must be treated by enemata and very mild laxatives, such as castor-oil and confection of senna.

2. TUBERCULAR PERITONITIS.

SYMPTOMS.—These come on very insidiously. The abdomen slowly enlarges until it at last attracts the notice of the patient, and when he first comes under the notice of the medical practitioner ascites to a considerable extent is present. The general health now begins to fail; emaciation, sweating, and diarrhœa, alternating with constipation, set in; the abdomen becomes tense, painful, and tender (the pain is at first deep seated); hectic, and gastro-intestinal irritation, resulting in vomiting and more severe diarrhœa, sooner or later supervene, the food is rejected, and the patient dies of asthenia. Sometimes the mesenteric glands and the folds of the mesentery are the chief seat of the tubercular deposit, and hard nodular tumours may be felt through the abdominal walls, and the chief, and it may be the only other symptoms present, are emaciation and swelling of the belly. This variety of the disease is called *Tubercular mesenteritis* and *Tabes mesenterica*. It is only in the latter stages of this variety that ascites becomes a prominent symptom. When the tubercular matter is deposited simultaneously in the mesenteric and intestinal glands and upon the general peritoneal surface, the emaciation is very rapid and complete, and the pallor of surface extreme.

MORBID ANATOMY.—If the patient die within a month after he comes under treatment the peritoneal cavity will be found distended with clear serum, and the peritoneal covering of the intestines uniformly granular with miliary tubercles the size of hemp seeds. The mesenteric glands are more or less enlarged and hardened. In the more chronic form of the disease, the mesenteric glands will be found greatly enlarged, forming hard nodular matted masses. When opened the centres of many will be found softened. In those cases where persistent and intractable diarrhœa has been a prominent symptom, we may expect to find tubercular ulceration of the mucous membrane of the small intestines. (See page 574.)

DIAGNOSIS.—From ascites, caused by hepatic disease, by the absence of jaundice and hepatic enlargement or inequality. From enteric fever (see page 333). The disease is often accompanied, sooner or later, by symptoms of pulmonary phthisis.

TREATMENT.—Iodide of iron alone or combined with cod-liver oil. Alternate infusions of cod-liver oil and iodine unguents into the abdomen. Chalybeate tonics. The gastro-intestinal symptoms must be treated as directed under Phthisis and Tubercular Ulceration of the Intestines.

ASCITES—DROPSY OF THE BELLY.

SYMPTOMS.—A progressive and uniform enlargement of the abdomen, accompanied, when the quantity of fluid is large, by tension of the parietes; dulness on percussion over the whole abdomen, when the fluid is abundant; and when the quantity of fluid is small, over the part to which the position of the patient may cause it to subside, the rest of the abdomen being tympanitic; and a sense of fluctuation becoming more and more distinct as the quantity of fluid increases.

The general symptoms which accompany ascites are due to the pressure exercised by the accumulated fluid, and in those cases in which ascites is merely a symptom of some other diseases, to the particular disease present. The symptoms arising from the pressure of the fluid are the following:—difficulty of breathing; suffusion of the countenance, and injection of the eyes; and distension of the superficial veins of the abdomen. Thirst, a dry skin, scanty urine, and torpid bowels, are among the most common accompaniments of ascites.

The disease seldom continues long without inducing, or being accompanied by, an anasarctous state of the lower extremities.

CAUSES.—The general causes of dropsy (see Hydrops); disease of any organ obstructing the portal circulation. Ascites, therefore, is the immediate consequence of obstructive diseases of the liver, and of cirrhosis in particular; cancerous disease of the pancreas, involving the portal vein, is a frequent cause of ascites. Diseases of the spleen and mesenteric glands; of the heart, lungs, and kidney; scarlatina; loss of tone in the peritoneum after pregnancy; chronic or subacute inflammation of the peritoneum; local injury, are other causes of ascites.

DIAGNOSIS.—From *ovarian dropsy*, by the uniform enlargement and greater width of the abdomen, which sways from side to side according to the position of the patient. From *tympanites*, by the dulness on percussion over the seat of the fluid, or over the greater part of the abdomen. When the intestines are distended with air they float on the surface of the fluid, giving a tympanitic resonance to the superior parts of the abdomen. The pregnant uterus forms a defined rounded tumour, which contracts under the hand; moreover, we may feel the foetal movements, and hear the pulsations of the foetal heart. A distended bladder forms an uniform pyriform enlargement of the abdomen, and is associated with constant dribbling of urine.

PROGNOSIS.—*Favourable*. The ascertained absence of organic disease of the viscera of the chest and abdomen. The urine healthy, in quality

and quantity, and not coagulating by heat; moist skin; the swelling of the abdomen diminishing; the respiration becoming free; the strength little impaired. *Unfavourable*.—Organic disease of the viscera of the chest and abdomen, especially of the liver; great emaciation; sympathetic fever; coma; an impaired constitution; previous bad habits of life, especially intemperance.

TREATMENT.—If pain and tenderness on pressure exist, leeches to the abdomen, followed by mercury so as to affect the mouth. If both are absent, the treatment must vary with the disease, of which the ascites is the effect. If disease of the liver, heart, lungs, or kidney be present, the remedies appropriate to that disease. The remedies for the dropsy itself, irrespective of the causes which may have produced it, are diuretics, and drastic purgatives, unless contra-indicated by existing symptoms. The class of diuretics to be preferred must depend partly upon the cause of the dropsy, and partly on the existing state of the patient.

If, after a fair trial has been given to these remedies, the pressure and tension of the abdomen become insupportable, recourse must be had to tapping.

Ascites is often combined with anasarca.

DISEASES OF THE LIVER.

CONGESTIO	Congestion of the Liver.
HEPATITIS	Inflammation of the Liver.
ABSCCESS	Of the Liver.
ACUTE ATROPHY	Of the Liver.
BILIARY CONCRETIONS, or	Gall Stones.
ICTERUS.	Jaundice.
OTHER DISEASES	Of the Liver.

CONGESTION OF THE LIVER.

VARIETIES.—1. Sanguineous. 2. Biliary.

1.—SANGUINEOUS CONGESTION.

SYMPTOMS.—A sense of fulness and weight in the right hypochondrium, rarely amounting to a dull pain; enlargement of the liver, so that the lower edge can be felt two or three fingers' breadth below the margin of the ribs; sallowness of the complexion, with sometimes distinct yellowness of the conjunctiva; in severe congestion, complete jaundice; tongue coated with a white fur; bowels torpid; anorexia.

MORBID ANATOMY.—Increase in the size and weight of the liver, which is dark-coloured and engorged with blood. If the congestion have affected the hepatic and portal veins unequally, the liver will have a distinct mottled appearance. When the congestion affects only

the hepatic vein, the lobules have a light border (C) and a dark centre (A); the congestion is chiefly intralobular (Fig. 67). When the portal

Fig. 67.

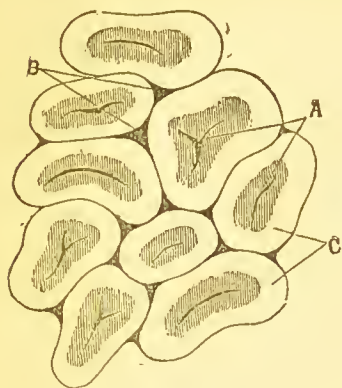
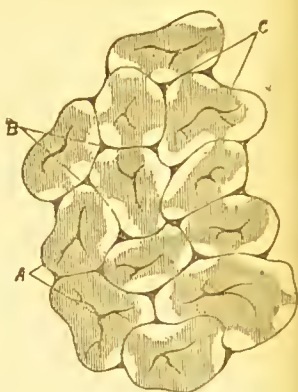
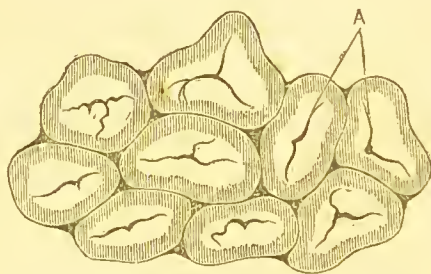


Fig. 68.*



vein is alone congested, the outer portions of the lobules are darker than their centres, and the congestion is said to be interlobular (Fig. 69).

Fig. 69.



CAUSES.—Diseases of the heart and lungs, and tumours within the chest, obstructing the thoracic circulation; functional derangement of the liver itself, with diminution of the activity of the secreting function; intermittent fever; purpura; impurity of the blood from the ingestion of improper diet and excess of alcoholic fluids.

TREATMENT.—When due to heart or lung disease, the same treatment must be adopted as for congestion of the stomach arising from the same causes. In all other cases, gr. v. *Pilulæ hydrargyri*, or gr. iv. *Calomelanos*, followed, after twelve hours, by a brisk saline purgative, should be prescribed, and a light farinaceous diet, and abstinence from fermented or spirituous liquors enjoined.

* Fig. 68 illustrates a diffuse form of intralobular congestion spreading from lobule to lobule.

2.—BILIARY CONGESTION.

SYMPTOMS.—"A bilious attack," viz., vomiting and purging of matters highly charged with bile, usually preceded by constipation, and accompanied by pain in the hepatic region, some enlargement of the liver, and a bilious tinge of the conjunctivæ.

CAUSES.—Biliary congestion is the effect of excessive functional activity of the liver, induced by excessive eating and drinking, by indolent habits, and more readily by a combination of both. The functions of the liver and lungs are to a considerable extent vicarious of each other. The digestion and assimilation of animal diet is attended by the separation of a large quantity of hydrocarbon from the blood. If the respiratory function be sufficiently active, this is consumed in the lungs, and excreted as carbonic acid and water; but if, as is the case in tropical climates, the respiratory function be insufficient for this purpose, the hydrocarbon is separated by the liver in the form of the fatty acids of the bile. This secretion becomes immoderate, the liver is congested with it, and occasional relief is afforded by the occurrence of bilious diarrhœa. This result happens both to those natives of cold climates who, when resident in tropical regions, do not adapt their diet to the altered conditions of their existence, and to those who, in any climate, feed heartily and take but little exercise.

Biliary congestion is of course an immediate consequence of closure or obstruction of the common bile duct.

TREATMENT.—After a dose of calomel or blue pill, free saline purgation; abstinence from fermented and spirituous liquors; plain diet, consisting chiefly of farinaceous substances.

HEPATITIS—INFLAMMATION OF THE LIVER.

VARIETIES.—1. Hepatitis acuta. 2. Hepatitis chronica.

1. ACUTE HEPATITIS.

SYMPTOMS.—Pain in the right hypochondrium, increased by pressure, by deep inspiration, by coughing, or by lying on the left side; dry cough; difficulty of breathing; shooting pains in the chest, resembling pleurisy; sympathetic pain in the right shoulder; yellow tinge of the conjunctiva, and sometimes actual jaundice; high-coloured urine; vomiting; hiccup; rigidity of the right rectus muscle; costiveness or diarrhœa. There is also more or less pyrexia. In some cases, the fæces are of a clay colour, owing to a deficiency of bile; in others, the bile is in excess, and is rejected by vomiting and stool.

When the *concave* surface of the liver is affected, the pain is more obscure, and is referred to the back; the breathing is less anxious; but the functions of the stomach are more disturbed. The same disturbance takes place when the left lobe of the liver adjacent to the stomach is inflamed; and when the posterior and inferior portion of the organ is implicated, there is more or less pain in the kidney, or disturbance of its function.

TERMINATIONS.—In resolution ; in diffused or circumscribed abscess ; in gangrene ; in chronic disease.

CAUSES.—All the common causes of inflammation ; external injury ; intemperance ; protracted biliary congestion ; dysentery ; pneumonia ; phlebitis of the portal vein or its tributaries.

DIAGNOSIS.—From *pneumonia*, by the absence of the local signs of this disease ; by the pain in the shoulder ; and by the local pain, increased by pressure ; by the yellowness of the skin and conjunctiva ; by the colour of the urine and fæces ; and in many cases by the absence of cough and expectoration.

From *gastritis*, by the seat of the tenderness upon pressure, and by the colour of the eye and skin, of the urine and fæces.

PROGNOSIS.—*Favourable*. About the third, fifth, or seventh day, bilious diarrhœa ; universal and free perspiration ; hæmorrhage from the hæmorrhoidal veins ; an abatement of fever.

Unfavourable.—Intensity of pain and fever ; the pain confined to a point ; continual hiccup ; cold extremities ; obstinate constipation ; rigors and hectic fever, indicating the formation of abscess.

TREATMENT.—Local depletion by cupping or leeches ; or, when the hæmorrhoidal or catamenial evacuations are suppressed, the abstraction of blood from the anus ; blisters over the seat of the pain ; brisk saline aperients ; saline and antimonial diaphoretics ; mercurial inunction, especially during the inflammatory stage of the disease ; a low diet, consisting chiefly of farinaceous food.

2. CHRONIC HEPATITIS.—CIRRHOSIS.

SYNONYMS.—Hepatitis chronica, diffusa, adhesiva ; interstitial hepatitis ; hob-nailed liver ; gin-drinkers' liver ; chronic atrophy.

SYMPTOMS.—The early symptoms of chronic hepatitis are very obscure. A sense of weight and obtuse pain in the region of the liver, increased by deep pressure or by lying on the left side, with enlargement and preternatural hardness of the organ, obvious to the touch. During the progress of the disease, symptoms of more acute hepatitis, and sometimes jaundice, are occasionally present. There is a sense of fulness and distension of the stomach, with flatulence, and loss of appetite. The countenance is sallow, and the skin harsh and dry ; the patient is torpid, inactive, and desponding ; the bowels are obstinately costive ; the stools deficient in bile ; and the abdomen enlarges imperceptibly at first, and well-marked ascites is usually present when the attention of the physician is first called to the case. The ascites increases ; the legs become œdematous ; the veins of the abdomen are prominent ; the urine is scanty, and deposits lithates, but rarely or never contains albumen. Symptoms of congestion of the alimentary canal appear :—the furred tongue is dryish, there is much thirst, and hæmorrhage from the bowels or stomach is very liable to occur. The blood becomes much impoverished, and slight wounds bleed profusely ; minute capillary aneurisms occasionally form in the skin, and these are

prone to burst when they bleed freely. Under careful treatment the patient may improve for a time, but sooner or later the digestion fails, and he loses flesh, and becomes anæmic; a copious hæmorrhage from the bowels, or profuse diarrhœa, causes great debility, and ultimately the patient dies exhausted.

PATHOLOGY.—Diffuse inflammation of the connective tissue of the portal canals and interlobular spaces, with the effusion of solid products. These subsequently undergo organization and contraction, and form a dense fibrous network of new connective tissue which everywhere pervades the liver. The contraction of the new material causes obliteration of the smaller branches of the portal vein and bile ducts, resulting in atrophy of the lobules, that is, of the capillaries and tubular network, with its contained secreting cells. Great obstruction to the portal circulation thus gradually results, ending in the most irremediable form of ascites and dropsy of the lower extremities.

MORBID ANATOMY.—The liver reduced in size, of a light yellow colour like beeswax, and presents a coarse tubercular appearance, its surface being studded over with rounded elevations of various sizes, projecting from the interior. Capsule thickened and opaque; tissue harder than normal, sometimes it cuts like gristle; the cut surface presents intersecting lines of opaque connective tissue, forming a coarse network in which the yellow nodular masses are contained. The walls of the portal vein are thickened and surrounded by condensed connective tissue, their calibre is much diminished. The gall-bladder is collapsed, and contains a little transparent golden-yellow or light ochre-coloured grumous fluid. On minute examination, a large portion of the hepatic cells are found to be destroyed, and their places occupied by masses of light-yellow pigment, scattered through a network of newly-formed connective tissue. In other places the cells are observed to be shrunk, and many are in a state of fatty degeneration. The capillaries of the lobules undergo degeneration, and their place is supplied by a few narrow vessels which serve to convey the blood into the radicles of the hepatic vein. The bile ducts are atrophied, and many of the smaller branches, as well as most of the tubular network within the lobules, obliterated. Great enlargement of the spleen, and congestion of the alimentary canal.

CAUSES.—The acute form; the imbibition of ardent spirits; the disease is very common amongst cabmen, who take frequent draughts of neat spirits; the syphilitic poison.

DIAGNOSIS.—Sallowness of the skin, never amounting to jaundice; a dryish tongue, and thirst, preceded or accompanied by a little dull pain and tenderness in the right hypochondrium, coming on after the age of puberty, is strong presumptive evidence of cirrhosis. If these symptoms occur in a person who has indulged freely in spirituous liquors, the case is quite clear. In *tubercular peritonitis* there is diffused pain and tenderness over the whole of the belly, and the sallow look of cirrhosis is absent; the ascites, moreover, is never so great as in cirrhosis, and the fluctuation is less distinct, because the fluid is

retained in pouches formed by the adherent intestines. In *cancer* of the liver the ascites is never very great; the liver, moreover, enlarges, and there is the characteristic cachexia, sweating, and emaciation, and eventually jaundice. The nodulated enlargement, known as the "lob-nail liver," may be perceived through the parietes, and distinguished from the single large round projection caused by a collection of *hydatids*, and from the smooth round tumour near the margin of the liver, caused by a *distended gall-bladder*.

PROGNOSIS.—If the disease have made such progress as that its nature is undoubted, the prognosis will be very unfavourable; the fatal termination will be distant in proportion to the stage of the disease and the strength of the patient.

TREATMENT.—*Indications.* I. To subdue existing inflammation. II. To relieve the circulation through the vena portæ and to improve the general health.

I. The first indication is fulfilled by the occasional application of leeches to the region of the liver as often as it is tender to the touch; by blisters; and by mercurial preparations in small doses, often repeated, with mercurial inunction, so as slightly to affect the gums.

II. The second indication is fulfilled by saline aperients, given every morning, so as to keep the bowels loose. When the intestinal canal is healthy, drastic purgatives are often more effective than any other remedies. If the digestive powers are much impaired, a course of bitter tonics, such as the infusions of gentian, quassia, or calumba, with soda, or some preparation of steel, if the patient be anæmic. The nitric or nitro-muriatic acid is frequently of use. It may be given internally, in doses of ten or twenty drops, with any of the tonic infusions, or it may be used, greatly diluted with water, as a bath. Tapping must only be resorted to in the extremest urgency, as it is never followed by permanent advantage.

ABSCESS OF THE LIVER.

SYMPTOMS.—If in a case of hepatitis severe rigors occur, followed by well-marked hectic fever, and the previous continued pain, whether dull or acute, be exchanged for a distinct throbbing, there is reason to believe that suppuration has taken place. Rigidity of the parietes of the abdomen, especially on the right side, and in the right rectus muscle, is also of common occurrence in abscess of the liver.

Abscess of the liver may burst into the stomach, and be emptied by vomiting; into the colon or duodenum, and be evacuated by the bowels; through the diaphragm into the cavity of the chest, giving rise to empyema; into the lung or bronchial tube, and be expectorated; or, it may open externally, between the ribs, or below them through the muscles of the abdomen or back. In very rare cases, the abscess discharges itself into the pericardium, into the pelvis of the kidney, into the ascending vena cava, or into the cavity of the abdomen, where it sets up fatal peritonitis.

CAUSES.—*Predisposing.* Those of the inflammation of the liver which precedes it. *Exciting.*—Phlebitis (leading to purulent deposits in the liver and lungs). Dysentery. Operations on the rectum, bladder, or vagina. Ulceration of the stomach and intestines. Animal parasites belonging to the following genera, *Echinoecoccus*, *Distomum*, and *Bilharzia*.

COMPLICATIONS.—*Ascites.* Inflammation, more or less extensive, of the organs upon which the abscess presses, and through which it ultimately discharges itself.

DIAGNOSIS.—The nature of the disease will be inferred from the colour of the discharged matter, and from the rigors, throbbing pain, and hectic fever attending the process of suppuration.

PROGNOSIS.—This will depend, in great measure, on the direction in which the abscess discharges itself, and on the degree of inflammation and fever which accompany its progress. The prognosis is most favourable when the opening is in the parietes of the chest or abdomen. The prognosis is less favourable before than after the discharge of the abscess, as the process of suppuration gives rise to severe constitutional irritation. It is in the highest degree unfavourable when the abscess discharges itself into the peritoneal cavity. If the abscess become encysted, the health may remain unimpaired for years.

TREATMENT.—Should the abscess point externally, it must be brought forward as quickly as possible by poultices and fomentations, and the matter must be discharged by means of a trochar and canula. Such an operation must not be attempted if we have reason to infer that there is no adhesion between the sac of the abscess and the abdominal wall. At the same time, a generous diet, and tonics, especially quinine and the mineral acids, must be prescribed.

ACUTE ATROPHY.

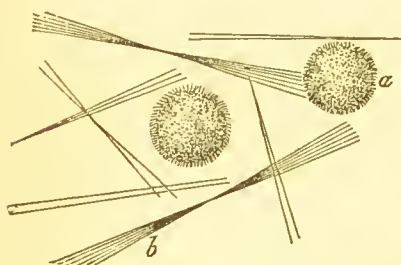
DEFINITION.—Acute disease of the liver, probably of an inflammatory nature, leading to total suppression of bile and degeneration of the secreting structure.

SYNONYMS.—Yellow atrophy. *Hepatitis diffusa*.

SYMPTOMS.—Before any positive symptoms appear, there usually exist, for a variable period of a week or more, indications of hepatic derangement; the bowels are irregular, sometimes purged and sometimes constipated; the abdomen is slightly tender, the tongue coated; there is loss of appetite, and headache. Sooner or later the skin presents a slight jaundiced tint. This jaundice may exist for a week or fourteen days, or even longer, at the end of which times severe symptoms of biliary suppression manifest themselves, and the disease runs a violent course, terminating fatally in twelve or twenty-four hours, or more rarely in a week. The skin, which was at first cool and dry, now becomes hot, and of a deeper yellow colour; the pulse rises

to 110-120; the head is hot and painful; severe vomiting comes on, first of grey mucus, afterwards of blood, clotted, or grumous like coffee grounds; hæmorrhage, from the bowels, uterus (with abortion), and nose, is liable to occur. There is pain in the right hypochondrium, and the hepatic dulness is found on percussion to have diminished or disappeared, while that of the spleen has increased; the bowels are confined, and the stools firm, dry, and clay-like, from deficiency of bile; occasionally they are tinged with bile. The urine is normal in quantity and specific gravity, and of a dark-brown colour, and gives the reactions of bile pigment. Spontaneously evaporated on a glass slide, microscopical yellowish crystals of leucin and tyrosin in fine needles, aggregated into bundles or dense opaque stellate masses are formed (see fig. 70),

Fig. 70.



which represents crystals of tyrosin. The pain in the head increases in severity, violent delirium sets in, and is succeeded by convulsions, stupor, and deep coma; hiccup and diarrhœa are often present at this stage; the skin becomes deeper coloured, and frequently covered with petechiæ and ecchymoses, and the motions are tar-like, from the presence of blood. In this condition the patient usually dies. It rarely happens that after free evacuation of the bowels, consciousness returns, the jaundice diminishes, and recovery takes place.

MORBID ANATOMY.—Liver shrunken, shrivelled, and flabby. Sections present a smooth, shining surface, of an ochre yellow colour; but no division into lobules is visible. When minutely examined no trace of hepatic cells can be found; the atrophied hepatic tissue is composed of fine yellow or pale molecules; a little oil in fine spherules; here and there irregular masses of a dark-brown colour, and bundles or radiating crystalline masses of tyrosin; the biliary ducts are everywhere pervious, and their lining pale. The gall bladder nearly empty, containing only a small quantity of grey mucus or grumous pale yellow fluid, neutral, and giving the ordinary reactions of bile. The blood of the hepatic vein is rich in crystals of tyrosin, but this compound is absent from the blood both of the portal vein and hepatic artery; decoction of the wasted liver deposits much tyrosin and leucin. Lencin and urea are accumulated in the blood of the heart. The urine is deficient in phosphate of lime and urea, and contains large quantities of leucin, tyrosin, and extractive matters of a peculiar nature. The spleen is enlarged and congested; and extravasations of blood between the folds of the mesentery are occasionally found. (Frerichs.)

CAUSES.—*Predisposing.* Youth; irregular and dissolute habits; syphilis; pregnancy; certain miasmata (?).—*Exciting.* Rokitsansky supposed the atrophy was produced by liquefaction of the hepatic tissue by

excess of bile, but there are no facts to support this view; the symptoms and morbid anatomy both point to diffuse inflammation of the hepatic tissue:—"hyperæmia and grey exsudation in parts not yet broken down" have been noticed. (Frerichs.) The obstruction to the portal circulation, causing the splenic enlargement and the gastro-intestinal congestion, are accounted for by the loss of function of the hepatic cells and the consequent collapse of the liver.

DIAGNOSIS.—Acute atrophy may be mistaken for typhus, pyæmia, and yellow fever. There appears to be a close relation between yellow fever and acute atrophy of the liver, but whether such be really the case has not as yet been determined. Acute atrophy may be known by the diminution in the bulk of the liver, and by the peculiar character of the urine above mentioned.

PROGNOSIS.—Exceedingly unfavourable.

TREATMENT.—At first a powerful emetic, and afterwards a large dose of calomel, followed by a strong saline aperient; hot baths; leeching and cupping of the right hypochondrium, or six leeches may be applied around the anus. An occasional dose (v. grains) of quinine in a little water may be given.

BILIARY CONCRETIONS—GALL-STONES.

SYMPTOMS.—Biliary calculi give rise to no pain or inconvenience, unless they occasion some impediment in the gall-ducts. The passing of the gall-stone is accompanied by the following symptoms:—Excruciating pain in the epigastrium, extending to the right hypochondrium and back, occurring in severe paroxysms, with intervals of comparative ease, during which there is a dull heavy pain in the epigastrium, generally relieved by firm pressure. Nausea, frequent vomiting of a clear sour fluid, and constant hiccup, are also often present, and jaundice commonly supervenes in the course of the attack. The urine generally contains bile, and the motions are pale from its absence. The general symptoms are an infrequent full pulse, or a frequent and feeble pulse, with profuse perspiration; or, if inflammation be present, the symptoms of fever. The passage of the calculus from the gall-ducts into the intestine is attended by a sudden cessation of the pain.

TERMINATIONS.—In inflammation, followed by suppuration, the discharge of the calculus externally, or through some internal organ, as in ordinary abscesses of the liver. After the escape of the gall-stones into the intestines, constipation or obstinate obstruction of the bowels, either immediate, when the stones are large, or remote, when they have become the centres of intestinal concretions. Sometimes a large number of calculi are found in the gall-bladder and gall-ducts after death, though no sign of their presence existed during life. Complete

obstruction of the common bile duct, and deepest jaundice may exist for several months, or even years, without preventing the patient from following heavy manual work; but after a time he lapses into the anæmic state, and ultimately dies of inanition.

MORBID ANATOMY.—After long retention of bile from closure or obliteration of the common bile duct, the ducts in the liver are found enormously dilated, while the liver itself is shrunken and atrophied. It is of a deep olive colour; the secreting cells are destroyed, and their place occupied by free oil globules and dark granules of biliary matter.

DIAGNOSIS.—The pathognomonic sign is the excruciating pain relieved by pressure. When the gall-stones are numerous, their presence may sometimes be detected by a rough crepitation under the finger. By watching the evacuations, and diluting them with water, the gall-stones may sometimes be seen floating on the surface. If the gall-stone be round and smooth, there is presumption in favour of its being the only one; but if it present a flattened surface, it may be inferred that there are several. The calculi may be as small as a pea or larger than a walnut. They have been found in the intestines of great size, and moulded so as to fill the canal, giving rise to serious obstruction. They are commonly of a dark-yellow brown colour, of soft consistence, and have several flattened surfaces. They consist of cholesterin and the colouring matter of the bile, sometimes blended with carbonate or phosphate of lime.

TREATMENT.—*Indications.* I. To relieve the severity of the spasm. II. To reduce existing inflammation.

I. The first indication is fulfilled by opium, chloroform, the hot bath, hot fomentations, or emetics. The *opium* may be given in doses of a grain, or twenty drops of laudanum, every hour, and in a clyster every six hours (forty minims to one drachm in four ounces of starch or gruel). *Emetics* are admissible in the absence of inflammation, but not when inflammatory symptoms exist.

II. The second indication is answered by *bleeding*, which is useful chiefly as an antiphlogistic measure; but as it produces debility, it also tends to relax existing spasm. It should always be employed in plethoric persons, or in those prone to suffer from inflammatory diseases. It may be followed up, in the absence of vomiting, by nauseating doses of tartar-emetic.

ICTERUS—JAUNDICE.

SYNONYMS.—Morbus arquatus; aurigo; morbus regius.

SYMPTOMS.—Languor; inactivity; nausea; loss of appetite, and bitter taste in the mouth; and sense of uneasiness or pain in the right hypo-

chondrium. The tunica conjunctiva of the eye and the whole surface of the body are of a yellow colour; the urine is high-coloured, and tinges linen yellow; the stools are of a clay colour, but in some cases are, like the urine, of a yellow colour; the bowels are usually costive, but the patient is sometimes troubled with diarrhœa; in extreme instances, the sweat and saliva are yellow, and all objects seen by the patient are tinged of the same colour. The pulse is generally slow, yet sometimes, especially when the pain is acute, becomes quick and hard, and there is a feverish heat and dryness of the skin. In some cases, also, the skin is the seat of a troublesome sensation of heat and pricking. Should the disease be long protracted, petechiæ and maculæ sometimes appear in different parts of the body; the skin, before yellow, turns brown or livid; even passive hæmorrhages and ulcerations have broken out, and the disease has in some instances assumed the form of scurvy.

CAUSES AND PATHOLOGY.—Jaundice is directly produced in the liver by the transudation of bile through the walls of the distended bile ducts and the contiguous capillaries, into the blood. The ultimate cause of jaundice is therefore retention of the bile within the liver. The retention may be complete or incomplete. *Complete retention* is caused by the impaction of biliary calculi in the hepatic duct or its main branches, or in the common bile duct, by the pressure of cancerous tumours of the pancreas, duodenum, pylorus, and of the liver itself; by the pressure of fecal accumulations, and of the enlarged uterus; by inflammation of the lining membrane of the ducts causing their occlusion.

Inflammatory occlusion of the duodenal orifice of the common duct may probably be sufficient of itself to cause complete retention.

Spasmodic closure of the bile ducts was formerly regarded as a frequent cause of jaundice. It may be a transient cause of retention, but it is highly improbable that jaundice which persists for some days is due to spasm.

Incomplete retention may result from biliary congestion; from the effect of certain poisons, especially the poison of serpents; from mental emotion, which may act directly upon the circulation in the liver by affecting the nerves distributed to the coats of the portal vein, or immediately by influencing the heart.

Jaundice is a prominent symptom of the severer forms of intermittent and relapsing fevers; it occasionally appears in a milder degree, during attacks of typhus fever, pneumonia, and pyæmia. To account for its appearance in these latter cases, and in some other conditions where the bile ducts remain pervious, Frerichs* has propounded the theory of "obstructed metamorphosis of bile in the blood." This theory assumes that the colourless fatty acids of the bile are absorbed by the intestines into the blood, and are there transformed into biliary pigment. Before this pigment can appear in the conjunctiva or in the urine it is in a state of health transformed by the respiratory process into compounds which are no longer endowed with the properties of bile pigment. But in certain diseases, such as pyæmia and pneumonia, in which the oxidising

* "Diseases of the Liver," vol. i. New Sydenham Society.

process (respiration) is defective, the metamorphosis of the biliary pigment is incomplete, and faint jaundice or sallowness of the skin, or pigmentary deposits in the urine, such as a blood-red colour, and deposits of uroglauclin and urophæin appear, to indicate the several stages of the metamorphosis.

The facts upon which this theory is founded are the following:—

1. "The pure colourless acids of the bile may, by the action of concentrated sulphuric acid, be transformed into *chromogene*, which upon exposure to the air, and still more readily on the addition of nitric acid, exhibits alternations of tints corresponding in every respect with bile pigment." 2. "The same pigments and colour-producing substances (*chromogene*) which in their properties precisely resemble cholepyrrhin (the colouring matter of human bile) are produced by the injection of colourless bile into the vascular system of living animals." 3. "The normal presence of a considerable quantity of taurin in the lungs." Such a theory is not necessary to account for the production of jaundice in pneumonia and pyæmia. Both congestion of the liver and hepatitis may produce the slight jaundice occasionally present in these diseases. Both of these conditions, the one as a consequence and the other as an accident, accompany pneumonia; and suppurative hepatitis is one of the commonest results of pyæmia. Neither, when we consider analogous changes, does the sudden production of jaundice from fear, or other intense mental emotion, involve any special difficulties. Sudden fright, we know, will often cause an immediate exsudation from the skin and alimentary canal, leading, in the latter case, to profuse diarrhœa; and if we imagine a similar relaxation of the biliary ducts allowing of the transudation of bile into the equally relaxed capillaries, we shall at once understand how the Abbé, as mentioned by Villermi ("Dict. des Scienc. Medic.," p. 420) became suddenly yellow when a mad dog rushed against him. Jaundice is frequently attributed to grief and other depressing passions, nor do we deny that it may be so produced; but we believe that if such cases were carefully investigated, in nine out of ten a much more palpable cause would be discovered, viz., alcohol, which is so often taken to blunt and dispel grief. Three cases which have lately come under my care have convinced me that this agent acts locally by producing inflammatory occlusion of the orifice, or of the orifice and some portion of the duodenal end of the bile duct. One history will serve for all three cases, so similar were the circumstances attending them. A young robust labouring man in perfect health, to allay a sudden vexation, got intoxicated by drinking three or four glasses of neat rum. The next day there was anorexia, nausea, and some pain and tenderness of the epigastrium. On the morning of the third day, the skin was moderately jaundiced, the urine contained much bile, the fæces were devoid of it, and the bowels constipated. The jaundice increased in intensity during the next three or four days, and then, under the influence of free saline purgation, gradually diminished, and disappeared at the end of twelve days. The simple and most obvious explanation of such cases is, that the gastro-duodenal inflammation caused by the raw spirit involved the

duodenal end of the common bile duct, and occluded it, and that thus the flow of bile into the intestine was prevented. The mineral irritants appear to act in the same way. A patient of mine took, by mistake, five doses of a strong solution of acid muriate of iron. It produced epigastric pain and tenderness, followed by deep jaundice. (J. H.)

DIAGNOSIS.—The characteristic symptoms which distinguish this from every other disease are, the yellow colour of the skin, and of the tunica conjunctiva of the eye; the deep-yellow colour of the urine; and, in most cases, the white or clay-coloured fæces.

PROGNOSIS.—*Favourable.* The disease having arisen from a cause that admits of easy removal; such as violent mental emotion, accumulated fæces, or temporary pressure during pregnancy; the strength and appetite little impaired; the disease appearing suddenly; cessation of local pain, followed by bilious diarrhæa. The disease, even in mild cases, runs a chronic course, the skin rarely recovering its proper colour under two or three weeks. *Unfavourable.*—Structural disease of the liver itself, or of the neighbouring viscera; complication with cancer; the previous irregular life of the patient; long-continued local pain and tumour; symptoms of hectic; colliquative diarrhæa; symptoms showing a determination to the head, as vertigo, flushed countenance, headache; supervening anasarca; a very dark colour of the skin.

TREATMENT.—Jaundice from inflammation of the liver, or from obstruction of the duct, requires the treatment of hepatitis or of biliary concretions. (See those diseases.) When, however, there is no pain in the right hypochondrium, no fever, and the paroxysms of acute pain due to the passage of gall-stones are absent, the treatment will consist in the use of emetics, and of gentle aperients to keep the bowels free. In the more strongly-marked cases of jaundice, we may begin the treatment by administering an emetic (Pulv. ipecac. gr. xx., Antimonii tart. gr. i.); and when that has ceased to operate, x. to xx. grs. of calomel, followed within two or three hours by an ounce of castor-oil. In cases of less severity, the treatment having been commenced by an emetic, the bowels may be kept free by some saline aperient. (℞. Magnes. sulph. ℥ss.* Magnes. carb. gr. x. Antimonii tartarati gr. ½. Aquæ menthæ pip. ʒi.) This medicine may be given during the whole of the illness, so as to keep the bowels open two or three times a day.

ICTERUS NEONATORUM.—The jaundice of new-born children usually appears a few hours after birth, attains its maximum in three days, and disappears in from seven to fourteen days. The urine contains bile pigment, and the motions are pale; the general health is unaffected.

Causes.—According to Frerichs, "the mode of production of icterus neonatorum in ordinary cases must be sought for in the diminished tension of the capillaries in the liver, which takes place upon the stoppage of the influx of blood from the umbilical vein, and which gives rise to an increased transfusion of bile into the blood."† It is difficult to understand how a partially empty condition of the blood-

* ℥i. = 100 grains.

† Dis. Liv., vol. i. p. 190. New Syd. Soc.

vessels of the liver can produce an increased transfusion of bile into the blood. It is much more reasonable to suppose that the jaundice in question arises from a *congested* condition of the hepatic capillaries. At the time of the ligature of the cord, the pulsation of the placental extremities of the hypogastric arteries has altogether ceased, or become very feeble, and much of the venous blood has drained out of the placenta into the body of the child. Such being the conditions, a little consideration will show that simultaneous ligature of the umbilical vein and hypogastric arteries must cause such disturbance of the balance of the circulation as, if uncompensated by the expansion of the lungs, will, after a few hours, result in general visceral congestion—ligature of the umbilical arteries at once producing increased pressure on the aortic circulation which is transmitted backwards through the heart to the inferior cava. (J. H.)

The jaundice of new-born infants is occasionally caused by constriction, an impervious condition, or congenital absence of the hepatic or common bile ducts; an inspissated state of the bile obstructing these ducts is also another cause. In these cases life may be prolonged for several weeks.

Treatment.—Mild laxatives, such as syrupus sennæ, preceded by gr. i. to gr. ii. hydrargyri cum cretâ.

OTHER ORGANIC DISEASES OF THE LIVER.

The liver is subject to several organic diseases besides those already described; namely, to fatty and waxy degeneration, syphilitic tumours, tubercular deposits, serous cysts, and hydatids, and to all the forms of malignant degeneration.

FATTY DEGENERATION.—The *symptoms* are, a smooth rounded margin felt three or four fingers' breadth below the margin of the ribs, increased dullness of the hepatic region, pale fæces, liability to profuse diarrhœa of pale evacuations. Skin pale, anæmic, waxy in appearance, and smooth to the touch. In drunkards it is distinctly greasy. There is no impediment to the flow of blood through the liver, therefore there is no dropsy nor hæmorrhage.

Morbid Anatomy.—Bile ducts empty; liver enlarged, pale, and greasy, or (in drunkards) dark dirty brown, and rotten (the nutmeg liver). Cells invaded with fat, and deficient in pigment granules. (Fig. 7, b, page 92.)

Causes.—Phthisis; habits of intoxication, and a sedentary life; Bright's disease. The disease admits of no direct amelioration.

SYPHILITIC DISEASE OF THE LIVER occurs in two forms. 1. Simple interstitial hepatitis. 2. Hepatitis gummosa. These forms may co-exist in the same liver.

The *symptoms, pathology, and morbid anatomy* of simple interstitial hepatitis are those of cirrhosis; the syphilitic variety of the disease, however, more frequently results in simple induration without the formation

of the nodules characteristic of cirrhosis. Hepatitis gummosa consists in the formation of white depressed deposits, having a radiated form, on the surface of the liver, and extending to a variable depth into the interior of the gland. In this opaque deposit, whitish or yellowish nodules, varying in size from a hempseed to a walnut, are found. They are composed of oil globules, cells loaded with fat, and fibres of connective tissue, being identical in structure with the common syphilitic node.

ALBUMENOID, WAXY, LARDACEOUS, OR AMYLOID DEGENERATION OF THE LIVER is associated with a similar degeneration of other organs. It occurs in syphilitic, rickety, and strumous individuals, and is often associated with fatty degeneration and cirrhosis. The *symptoms* are anæmia associated with albuminuria and uniform enlargement of the liver, sometimes to an enormous extent.

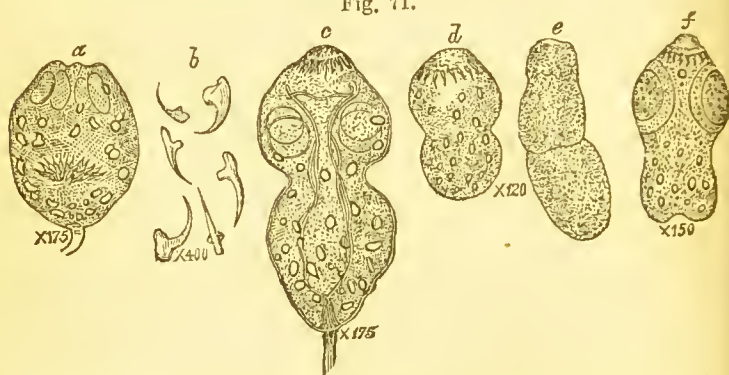
Morbid Anatomy.—In the early stage the lobular structure is unusually distinct, the centres of the lobules are reddish-yellow, translucent, firmer than natural, and sharply defined from the dull grey peripheral parts. As the disease advances the whole of the lobule is invaded, and when this has occurred they are no longer distinct, and the section of the gland presents a smooth, homogeneous, yellowish-red, glistening, semitranslucent surface. In advanced stages the liver has a waxy lustre, the molecular contents of the normal hepatic cells gradually disappear and give place to a homogeneous clear substance, which fills up the cavity of the cell, and the individual cell membranes can be no longer distinguished, so completely is the tissue transformed. The walls of the blood-vessels and ducts undergo the same degeneration. On moistening the section with solution of iodine, all the parts which have undergone the waxy degeneration are coloured deep red, and when subsequently treated with sulphuric acid, the red colour is changed to a dirty violet or blue, similar to that produced in cellulose with the same reagents. These reactions have led some observers to the opinion that the degeneration is of the nature of starch; but this is mere scientific trifling. Dr. Miller found that the morbid deposit was not fatty but *albuminous*, and only a small portion of yellow oily fat could be extracted by æther. (Budd, *Dis. Liv.*, 2nd edit., p. 307.)

HYDATID TUMOURS are more common in the liver than in any other organ. *Symptoms*, a globular tumour in the hepatic region having a tense feel and a history of slow, painless growth, and unaccompanied by any considerable derangement of the health, is fairly indicative of hydatid tumour of the organ. The tumour may have its seat on the under surface of the liver, and by pressure on the portal vein or bile duct cause ascites or jaundice; but this is rarely the case. An abscess is always preceded by some marks of inflammation. An aneurism of the abdominal aorta may be distinguished by strong heaving pulsation, bellows murmur, palpitation in the belly, and sympathetic pains in various parts of the body. Hydatid tumours sometimes attain to an enormous size. They may burst into the abdominal cavity, causing severe peritoneal pain, collapse, and death in a few hours; into the intestine, and be evacuated per anum; into the lungs, when their con-

tents are expectorated. These tumours may remain in a state of quiescence for a whole lifetime, but they are a source of constant danger because they may be ruptured by any accidental blow or fall.

Structure of the hydatid tumour.—The tumour (*echinococcus veterinorum*) is formed of a restricted development of a species of tape worm, the *Tænia echinococcus* of Siebold. It is composed of a delicate thin-walled cyst, called the parent cyst, surrounded by a thick-walled dense sac formed partly of an exsudation from the parent cyst and partly from a condensation of the hepatic tissue enclosing it. The parent cyst is filled with a clear salty fluid, floating in which are multitudes of delicate spherical secondary cysts varying in size from that of a pea to that of an egg. These secondary cysts are called *acephalocysts*; the larger contain fluid and another brood of *acephalocysts*. The inner surface of many of the *acephalocysts* presents a finely granular appearance; these granules are readily detached; they are *echinocoeci*, and have the appearances represented in fig. 71.

Fig. 71.



a, *Echinococcus* with circlet of hooklets retracted. b, hooklets. c d, *E.* expanded. e, *E.* imperfectly developed. f, *E.* showing suckers.

The parent cyst and its progeny are very liable to calcareous degeneration, their delicate walls becoming thickened and hardened by milk-white earthy matter.

Treatment.—Hydatid tumours should not be interfered with, and the patient should be warned against the effects of violence.

MALIGNANT DEGENERATIONS are very apt to occur in the liver. They assume the several forms of scirrhus, medullary sarcoma, and melanosis; and like malignant degenerations of other important viscera are necessarily fatal. They generally occasion a great increase in the size of the organ, and sooner or later produce obstinate jaundice and chronic ascites. The most common of these malignant diseases is the medullary cancer in the form of tumours, varying in size and scattered throughout the substance of the liver. They project from the surface, and can be felt through the attenuated walls of the abdomen.

The treatment is palliative, and varies with the symptoms, and the existing state of the system.

DISEASES OF THE SPLEEN.

The spleen is very liable to congestion ; it is sometimes the seat of inflammation, acute and chronic, which usually results in simple enlargement. It is also liable to waxy degeneration, to tubercular, and to syphilitic deposits. The diseases of the spleen may be treated under the single head of

ENLARGEMENT OF THE SPLEEN.

SYMPTOMS.—Dull pain in the left side ; dyspnœa ; dry cough ; inability to lie on the right side ; loss of flesh ; anæmia.

COMPLICATIONS.—Disease of the liver, an unusual tendency to hæmorrhage, dysentery, and scurvy, and to the anæmic or cachectic state, known as *leucocythemia* (see p. 290).

CAUSES.—Previous attacks of ague ; morbid degeneration, especially the deposit of tubercles ; morbid softening ; diseases of the liver obstructing the hepatic circulation ; enteric fever.

DIAGNOSIS.—By the situation of the tumour in the left hypochondrium, extending, in extreme cases, to the epigastrium, the umbilicus, and the hypogastrium ; by the tumour being solid and smooth, generally of an oblong shape, lying beneath the integuments, and moveable. The previous occurrence of ague always affords a probability in favour of the tumour being situated in the spleen.

TREATMENT.—The use of the iodine ointment, or iodine paint, externally, and iodide of potassium, with tonics, internally ; leeches to the seat of the disease, if there be much abdominal tenderness ; friction, in the absence of pain ; gentle aperients and alteratives, and moderation in diet. If the disease have been preceded by ague, bark or quinine.

DISEASES OF THE PANCREAS.

SYMPTOMS.—The symptoms of disease of the pancreas are still more obscure than those of disease of the spleen. Hard cancer is the disease to which this gland is most liable. The enlargement which accompanies diseases of the pancreas is not readily distinguished from that of the adjoining viscera ; and it is obviously very liable to be confounded with organic disease of the pylorus or duodenum. The symptoms generally present are, a deep-seated pain in the epigastrium, nausea, sickness, and emaciation. To these may be added, as of occasional occurrence, constipation or diarrhœa, salivation, and jaundice.

DIAGNOSIS.—Fatty stools afford a strong probability of disease of the pancreas ; but cases of pancreatic disease without fatty stools have been reported.

TREATMENT.—The treatment of supposed disease of the pancreas must be so shaped as to meet the urgent symptoms that happen to be present, and with due regard to the existing state of system. Fat and oily substances should, perhaps, be omitted from the diet.

CHAPTER V.

DISEASES OF THE URINARY ORGANS.

1. Diseases of the Kidney.
2. Diseases of the Bladder.

DISEASES OF THE KIDNEY.

NEPHRITIS	Inflammation of the Kidney.
OTHER DISEASES	Of the Kidney.
CRYSTALLINE DEPOSITS.	Gravel. Calculus.
HÆMATURIA	Bloody Urine.
ISCHURIA RENALIS	Suppression of Urine.
DIABETES	Immoderate flow of saccharine Urine.
CHYLOUS URINE.	
DIURESIS	Immoderate flow of Urine.

NEPHRITIS—INFLAMMATION OF THE KIDNEY.

VARIETIES.—1. Suppurative Nephritis. 2. Acute Desquamative Nephritis. 3. Chronic Desquamative Nephritis.

1. ACUTE SUPPURATIVE NEPHRITIS.

SYMPTOMS.—Deep-seated pain and tenderness in one or other loin; numbness in the thigh; frequent nausea and retching; more or less irritability of the bladder, and pain on micturition; considerable pyrexia; urine turbid from a smooth white finely granular deposit, which on examination is found to consist of free pus cells and pus cells contained in casts of the uriniferous tubes. (See Fig. 32, p. 151.) If an abscess form, it may burst into the pelvis of the kidney, and be discharged by the urethra; or it may point in the loin or groin, which parts previously become full and tender. Free suppuration is accompanied by hectic fever, under which the patient often sinks.

CAUSES.—Morbid conditions of the blood. External violence. Retention of urine. Renal calculi.

MORBID ANATOMY.—Kidneys enlarged, congested, scattered abscesses, varying in size from a walnut to a hempseed. Tubes stuffed with epithelial cells or pus corpuscles. If a calculus have been the cause of the disease, the kidney will probably be found destroyed, and

its outer portions converted into the sac of a large abscess which occupies its interior. Calculi usually lie in the pelvis of the kidney, and are the cause of suppurative inflammation of its mucous membrane (pyelitis). They ultimately lead to ulceration of the mamillæ, and degeneration of the entire kidney.

DIAGNOSIS.—Pus, derived from the kidneys, is moulded into tubes. The symptoms of inflammation of the pelvis are great renal pain and irritation, and the passage of large quantities of *free* pus.

TREATMENT.—In the early stage cupping or leeching of the loin. Hot baths. A brisk saline purge followed by full doses of compound ipecacuanha powder, and acetate of ammonia. In the later stages, quinine in combination with the mineral acids, or alone, may be given. If the inflammation be due to the presence of calculi, we must treat according to the rules given under Renal Calculi.

2. ACUTE DESQUAMATIVE NEPHRITIS.

SYMPTOMS.—In most cases slight rigor and pyrexia; pain in the loins and legs; headache; in some cases vomiting. In the course of a few days the face becomes pallid and swollen, and the legs at the same time œdematous. Ultimately there is general anasarca.

During the first few days the urine is very scanty, or even suppressed. It is of a dark-brown or red colour from admixture of blood. It is loaded with albumen. The pain in the loin persists, and on deep pressure there is much tenderness. Sometimes the pain is severe, and extends down the ureter to the bladder and thence to the testicles and down the inner aspect of the thighs. Nausea and vomiting accompany these symptoms. Inflammation of the serous membranes is very liable to occur during the existence of the febrile symptoms. Sometimes the grave symptoms—convulsions and coma—of suppression, suddenly supervene.

If the case progress favourably, the quantity of urine increases, and deposits a little cloud of flocculent matter, and the blood disappears. In the course of a week it may become quite clear, and remain of a pale colour and low specific gravity; it constantly contains albumen, the quantity of which may be variable. As convalescence approaches, the albumen diminishes to a mere trace, and the quantity of urine increases; sometimes as much as 120 ounces are passed in the twenty-four hours. The anasarca now gradually disappears, and the patient is ultimately left much emaciated and very weak. If the disease terminate fatally, death is preceded by diminution of the urine, until at last there is total suppression: Death more frequently occurs in the latter stages from chest complications, which result in apnœa.

CAUSES.—Scarlatina, measles, erysipelas; abuse of alcoholic liquors; suppression of the cutaneous excretions from exposure to wet and cold.

PATHOLOGY.—Excessive functional activity of the kidney, induced by a suppression of the cutaneous excretion, or in the attempt to eliminate certain poisonous matters from the blood. This leads to active conges-

tion and excessive growth of secreting epithelium, the cells of which, being changed in this abnormal process, become at last inadequate for the performance of their own special function—the elimination of the urinary constituents. These, in part, remain in the blood, and give rise to the characteristic symptoms of the disease. Meanwhile the capillaries of the kidney become dilated or even ruptured, and the constituents of the blood escape into the renal tubuli. The nutritive fluid becomes much impoverished; the albumen and red corpuscles undergo diminution, and the specific gravity of the serum of the blood falls, in consequence, from 1030 to as low as 1020 in some cases. But what is of more serious import still, urea—the essential constituent of the urine—accumulates in such large quantities in the blood, that its presence may often be detected in distant effusions in various parts of the body.

The fatal symptoms of urinary suppression are due to the presence of urea in the blood. At first the stomach endeavours to eliminate it, and hence the vomiting; but this vicarious function is insufficient for the purpose: the poison accumulates, and its action is manifested in the convulsions and coma which terminate life. It is considered by some that urea, as such, has no poisonous influence, and that the terrible symptoms of suppression only come on when this undergoes conversion into ammonia.

MORBID ANATOMY.—In death during an acute attack of the disease. Both kidneys are found to be involved. They are considerably enlarged and congested, so as to be of a dark-red or chocolate colour; the structure as firm or a little firmer than natural; the cortex is more or less mottled with spots of anæmia and ecchymosed tissue; the medullary cones are uniformly congested.

On minute examination the uriniferous tubuli are found, some crowded with epithelial cells, others filled with blood, giving rise to the ecchymosed spots observed on the capsular surface and in the interior of the gland; in others the clot has become colourless. Here and there blood may be observed effused into the capsule inclosing the Malpighian tufts. The walls of the capillaries themselves are thickened and opaque. The pelvis of the kidney, the ureters, and sometimes the bladder are congested, and there is general congestion of the internal organs and effusion into the serous cavities. The bladder is usually empty. If the disease have continued for a month or more, the kidneys will be found in one or other of the stages of degeneration described under Chronic Desquamative Nephritis.

DIAGNOSIS.—Œdema commencing in the delicate areolar tissue of the eyelids, nymphæ, or scrotum, followed by puffiness of the face and general anasarca; the dark smoky colour of the scanty urine, which is found to deposit blood corpuscles and casts of the uriniferous tubules filled with epithelial cells (Fig. 28, p. 150), are the signs by which acute desquamative nephritis, and its attendant dropsy, may be distinguished from other renal affections, and dropsies dependent upon hepatic, pulmonary, or cardiac diseases.

PROGNOSIS.—*Favourable* if the secretion of urine be free, and contain

comparatively little blood and albumen. *Unfavourable* if the urine be very scant and bloody, and if difficulty of breathing come on.

TREATMENT.—*Indications.* I. To reduce the inflammation. II. To restore the action of the skin. III. To divert the elimination of the *materies morbi* into other channels. IV. To prevent suppression of urine.

I. The first indication is fulfilled either by the use of cupping-glasses, or by the application of numerous leeches to the region of the kidney, followed by mustard-poultices.

If there be much febrile action, tartarized antimony, in diaphoretic doses, will be of much service. When pain is a prominent symptom, Dover's powder may be given in combination with the antimony.

II. The hot bath, or, still better, a hot-air bath, should be given, and acetate of ammonia simultaneously administered, in order to secure copious diaphoresis.

The temperature of the room should be kept above 70° Fahr.

III. Saline purgatives, in combination with senna or jalap, should be administered, so as to keep the bowels freely open. The diet should be restricted to gruel and farinaceous substances. Toast- or barley-water may be freely taken.

IV. If symptoms of suppression appear, the treatment recommended under *Ischuria renalis* (see p. 626) must be adopted.

3. CHRONIC DESQUAMATIVE NEPHRITIS.

SYMPTOMS.—These are at first usually unobserved, and from inattention to the health may long remain so. The disease is a frequent consequence of a slight attack of the acute variety, and we may generally trace back its origin to an indisposition caused by exposure to wet or cold. In many cases we fail to trace it to such a cause, and it appears to have crept on in consequence of a debilitated condition of the health. A considerable number of patients present the gouty diathesis, or are actually suffering from a renewed attack when the renal symptoms first appear. Emaciation, and anæmia, with an inclination to swelling of the eyelids and ankles, are the symptoms of debility which induce the patient to apply for relief. On inquiry we shall probably find that micturition is frequent, the patient passing a large quantity of urine, and being frequently disturbed several times in the night in order to void urine. In gouty subjects the urine is usually scanty and loaded with lithates. On examination it will be found to contain a variable quantity of albumen and casts of the uriniferous tubules resembling those which have been already described as characteristic of acute desquamative nephritis. The patient may remain in this state for months or even a few years, but at last dropsy comes on and becomes general, the urine decreases, the casts show great degeneration of the epithelial cells, and have a granular appearance (Fig. 29, p. 151); sometimes the cells are altogether absent, the cast itself looking like a film of wax, to which drops of oil are, in the latter stages, observed to adhere. Urea accumulates in the blood; the patient is seized with epileptic fits, which succeed each other in rapid succession, and he finally becomes comatose, and then dies.

MORBID ANATOMY.—In the earliest stage the kidneys are of normal size and weight, and appear healthy; the tubes of the cortex are filled with disintegrated epithelium; very few perfect cells are to be seen. In the next stage the kidneys are found atrophied and shrunken, weighing sometimes not more than $1\frac{1}{2}$ ounce; the tubuli are more or less completely denuded of epithelium, and atrophied; the cortex is contracted and reduced to a narrow layer covering the bases of the cones, and the Malpighian bodies more closely approximated. Some of the tubuli present dilatations, which, by becoming isolated and further distended, are converted into cysts containing a clear albuminous and often jelly-like fluid. The intertubular tissue has a fibrous appearance. The capsule is generally firmly adherent, and the surface from which it is removed granular. The granulations are composed of aggregations of degenerated tubules lying between the small branches of the hepatic vein. This condition very much resembles that of cirrhosis of the liver. If the disease have had its origin in gout, the kidneys will be small and atrophied, as in the last stage of chronic desquamative nephritis, but they will present the characteristic appearances described at p. 401.

If the chronic disease be a sequence of the acute variety, we may meet with two other morbid conditions of the kidney, viz., the “large white kidney” and the “red coarse mottled” kidney, both of which may be looked upon as intermediate stages between the swollen congested kidney, characteristic of the *first stage of acute desquamative nephritis*, and the small contracted kidney, the *last stage of chronic desquamative nephritis*. The coarse red mottled kidney is commonly found in those who had abused spirituous liquors: it is a mixture of congestion and fatty degeneration, the white spots which mottle the enlarged cortex, and the white lines which streak the pyramids being composed of fat.

PATHOLOGY.—COMPLICATIONS AND TERMINATIONS.—In consequence of the destruction of the secreting epithelium of the kidneys, the blood becomes contaminated with the constituents of the urine. The effects of the circulation of this impure blood are general. 1. The affinity between the growing and secreting structures and the blood is diminished, the capillary circulation is feeble and sluggish, and the heart, in its endeavours to overcome the impediment, becomes hypertrophied and dilated. Failing in its efforts, general anasarca is the result. 2. The gastro-intestinal and pulmonary mucous membranes take on an action vicarious of that of the kidney, and endeavour to eliminate the urinary constituents: vomiting, diarrhoea, and bronchitis are the consequences. 3. The impure blood tends to produce low forms of inflammation in various parts of the body; peritonitis, pleuritis, pneumonia, and, if the skin be slightly wounded erysipelas, may arise as complications at any time. The brain itself is sometimes affected, and fluid containing urea poured out into its ventricles. This is always the ultimate result when death occurs from suppression of urine.

DIAGNOSIS.—For the differential diagnosis of Dropsy see p. 300. Renal dropsy is known from other varieties, 1. By the absence of long-

standing pulmonary, cardiac, or hepatic diseases. 2. By the mode of its access, appearing first in the face, particularly the eyelids, on rising in the morning, and by slight puffiness of the ankles and scrotum towards evening; and 3. By the condition of the urine, from which the several stages of renal degeneration may be very safely inferred. If the tubular casts be composed of epithelial cells in a state of granular degeneration, we may assume that the kidney is in the second stage of degeneration. If the casts be large, and wholly denuded of cells, the degeneration is still further advanced. If these denuded casts contain oil globules, the organ may safely be regarded as in the last stage of atrophy.

PROGNOSIS.—The prognosis will depend, as Dr. George Johnson has so ably shown, upon the evidence furnished by the microscope as to the condition of the kidney, indicated by casts of the uriniferous tubules, to which reference has been made under Diagnosis. In the early stage of chronic as well as of acute desquamative nephritis recovery may be hoped for in the absence of any serious complications. In the later stages the prognosis is unfavourable. In the intermediate conditions the progress of the disease may, under favourable circumstances, be arrested.

CAUSES.—*Predisposing.* The scrofulous diathesis. It occurs in both sexes, and at all ages; at five, and even under, and so late as seventy-nine. (Christison.) Of seventy-four fatal cases recorded by Dr. Bright, nineteen were under thirty, fifty under fifty, thirteen above fifty, and four above sixty. *Exciting.*—Those of the acute varieties of the disease. The impure air, and other unwholesome influences to which the poor inhabitants of large towns are exposed; intemperance; mechanical injuries; cold; a previous attack of scarlatina, followed by dropsy; rheumatism; gont.

TREATMENT.—*Indications.* I. To relieve congestion of the kidney. II. To remove the attendant dropsy. III. To improve the general health.

II. This indication is fulfilled by purgatives and diaphoretics, diuretics being inadmissible. In the absence of diarrhœa, a drastic purgative, such as a full dose of the compound jalap powder, may be given every morning; at the same time five or ten grains of Dover's powder may be occasionally prescribed to act upon the skin. When there is much debility, stimulant diaphoretics, such as the liq. ammon. acet. in doses of $\mathfrak{z}\text{i}$. to $\mathfrak{z}\text{ii}$. three or four times a day, are indicated. The warm bath, or the hot-air bath, may be administered at intervals of one, two, or three days. The skin should be kept warm.

III. A nourishing and unstimulating diet should be prescribed; and preparations of steel, of which the tinctura ferri perchloridi (in doses of $\mathfrak{m}$ xx. or $\mathfrak{z}\text{ss}$.) is the best.

In the treatment of complications, due attention must be paid to the pathology of the disease; vomiting may be checked, but purging, we must bear in mind, is a natural safety-valve, and we must do no more than restrain it, if it become immoderate. If the œdema of the legs in-

crease, and the skin become painfully tense, much relief will be afforded by acupuncture, or slight incisions made on the outside of the legs.

PROPHYLAXIS.—Temperance, pure air, a clean skin, plain and wholesome diet, and regular exercise in the open air, are particularly to be enforced in persons who have suffered, or seem liable to suffer, from an attack of this disease.

OTHER DISEASES OF THE KIDNEY.

The kidney, in common with other vascular organs, is liable to many other forms of disease. Some of these may affect the kidney alone; others are associated with similar disease of the neighbouring viscera. So long as one kidney only is affected, the urinary function is unimpaired, the healthy organ becoming hypertrophied and performing double duty. The following are the diseases most commonly met with:—

I. *Cystic diseases*.—Cysts in the kidney, varying in size from a mustard seed to a marble, are of very frequent occurrence in the cortical part of the kidney. The atrophied kidney, characteristic of the last stage of chronic desquamative nephritis, very commonly presents a large number of minute cysts. Sometimes a kidney is found enlarged and lobulated, and converted into a few large cysts filled with glairy fluid, the intervening secreting structure being destroyed. There has been much discussion about the way in which cysts are formed in the kidney. The explanation given by Dr. Johnson is so satisfactory that it appears unnecessary to entertain any other view. According to Dr. Johnson's observations:—Some portions of the denuded uriniferous tubules become obstructed and obliterated, meanwhile other portions are distended into cysts by the secretion of albuminous fluid.

When an ureter becomes obstructed or obliterated, at first urine, and subsequently a watery fluid, continues to accumulate in the pelvis of the kidney, the secreting structure being meanwhile slowly absorbed by the pressure, and the whole organ finally converted into one large cyst. A similar change may result from an impediment to the flow of urine from the bladder, the ureters becoming dilated to the diameter of the small intestine. The term *hydro-nephrosis* has been employed to indicate the presence of such cystic tumours of the kidney as may be diagnosed during life.

The kidney is liable to morbid changes resembling those which commonly affect the ovary and give rise to ovarian dropsy. In one case which came under my notice, the symptoms were so precisely similar that the case was treated throughout for ovarian disease, the abdomen being uniformly and excessively enlarged, dull, and distinctly fluctuant on percussion. After death both ovaries and the other genital organs were found perfectly healthy, and had contracted no adhesions with the tumour. The tumour, which weighed forty-five pounds, was contained within a smooth-walled cyst; the ureter and upper end of the left kidney were directly continuous with the smooth

wall of the tumour. There were two principal cysts, which contained together nine pints of fluid,—colourless in one of the cavities, and dark brown in the other. The right kidney was healthy and hypertrophied. This patient had had two children; her age was thirty-four. Another case, presenting exactly the same symptoms, and generally, the same morbid appearances in connection with the left kidney also, occurred at the Stockport Infirmary during my residence there. The subject was a little girl about seven years of age. The abdomen was greatly distended as if by the gravid uterus. The age of the patient somewhat simplified the diagnosis; a tumour of the uterus it could hardly be, and ovarian disease seemed just as improbable; but yet from the uniformity of the swelling which had commenced in one iliac region, its fluctuation, and the absence of any urinary symptoms, most of those who formed a positive diagnosis were led to the conclusion that it must be ovarian. (J. H.)

II. *Fatty degeneration (the granular kidney).*—This is the condition to which the atrophied kidney of desquamative nephritis tends. The glands are large and pale, the cortex is anæmic, and mottled with opaque granulations of a yellowish white colour, giving a granular appearance to the kidney. On minute examination these granulations are found to be composed of fatty matter, the convoluted tubuli are lined with dark opaque cells composed of fatty molecules and drops of oil. (Fig. 8, p. 92.)

The early symptoms of the disease are those of desquamative nephritis; afterwards the pale albuminous urine is rather scanty and quite clear, occasionally depositing a little cloud of small waxy casts, to which minute globules of oil are found adhering.

III. *Albumenoid (waxy, lardaceous, amyloid) degeneration.*—The kidney, in common with other glands, is liable to this form of disease. The gland is usually increased in size; it is very hard, and cuts very firm; the surface of the section is smooth, homogeneous, and of a waxy translucent appearance. The minute structure of the degenerated tissue is that already described under albumenoid degeneration of the liver. (See p. 609.) This condition of the kidney appears to be derived from the "large white kidney," which is found in the second stage of acute desquamative nephritis. Perhaps the scrofulous diathesis, with which the albumenoid kidney is most frequently associated, determines the particular pathological condition into which the large white kidney may branch.

The term "*albumenoid*" is selected to designate this form of degeneration, because the morbid material is of the nature of albumen. "*Lardaceous*" and "*waxy*" are only appropriate in so far as they refer to appearances. The term *amyloid* is exceedingly inappropriate.

The symptoms of the disease are those of chronic desquamative nephritis.

IV. *Tuberculous and cancerous* deposits occur in the kidney in association with similar disease elsewhere, rarely or never alone. They form at first isolated rounded masses, which tend to become confluent and soften down in the centre. The softened products may be discharged with

the urine, from which the condition of the kidney may possibly be inferred.

V. *Hydatid tumours* of the kidney are uncommon.

CRYSTALLINE DEPOSITS IN THE URINARY ORGANS—GRAVEL—CALCULI.

SYMPTOMS.—Dull or acute pains, with a sense of heat and heaviness in the lumbar region; with more or less pain or difficulty in voiding the urine, increased by sudden and violent motion, with occasional pain behind the pubes; irritation at the neck of the bladder, and itching or pain at the extremity of the penis. Sometimes there is retraction of the testicles, with discharge of bloody urine, or of clots of blood. The urine, even while warm, contains a sandy powder, crystalline grains, or small calculi. It is generally rather scanty, high-coloured, of high specific gravity, acid, of a strong odour, and disposed to become turbid on cooling. The digestive organs are deranged; there is a sense of weight in the epigastrium, acidity of the stomach, flatulence and frequent eructation; constipation; furred tongue; dry skin; restlessness; and feverishness.

The most common form of gravel consists of urate (lithate) of ammonia, with or without free uric acid (*red gravel*). Next in point of frequency, is pure uric acid. The ammoniaco-magnesian phosphate, or a mixture of this with amorphous phosphate of lime (*white gravel*), comes next in order; then the oxalate of lime. These several sorts may be mixed, and the first and second may alternate with each other. When the deposits become aggregated to form small calculi, the symptoms are much more severe. (For the mode of distinguishing these several varieties, see p. 141, *et seq.*)

The symptoms of *calculus in the kidney* are those of gravel in its most severe form, or of nephritis—viz., pain in the loins, extending to the groin, testicle, or extremity of the penis, retraction of the testicle, painful and frequent micturition, and bloody urine. There are nausea and vomiting, restlessness, and slight fever. These symptoms are often suddenly removed by the discharge of a small calculus, often accompanied or followed by that of a large deposit of gravel. If the calculus remain in the kidney, it often leads to severe suppurative inflammation (*pyelitis*), and to those complications which result from it (page 612).

The symptoms of *Calculus in the Ureter*.—When a calculus is passing along the ureter, there are paroxysms of intense pain (a fit of the gravel), or a dull pain along the affected ureter and spermatic cord on the same side, extending to the penis, the testicle, or the inside of the thighs. There is frequently great tenderness in a circumscribed part of the abdomen, corresponding with the seat of the calculus. The patient is troubled with constant and often ineffectual calls to pass urine, which is tinged with blood. There are severe nausea and vomiting, with extreme anxiety and intense suffering. These symptoms may

pass off suddenly, on the arrival of the calculus in the bladder, followed, in some cases, by its discharge from the urethra. In other instances, the calculus remains impacted in the ureter, leading to disease of the kidney, or giving rise to large accumulations of urine, with distension of the ureter, of the pelvis, and even of the walls of the kidney itself. The kidney thus enlarged has grown to such a size as to fill the abdomen (*hydro-nephrosis*), and be mistaken for ascites.

The symptoms of *calculus in the bladder* are, frequent desire to pass water; during its passage a burning sensation at the orifice of the urethra; sudden interruptions of the stream, accompanied by great forcing and intolerable pain; after lying on the back the urine again flows; the discharge of the last ounce is attended with excruciating pain, caused by the contraction of the bladder upon the stone; frequently there is numbness and tormenting pain down the inside of the thigh. After violent exercise, or long continuance of the symptoms, the urine becomes purulent and bloody from inflammation of the mucous membrane of the bladder.

CAUSES.—*Predisposing*. Constitutional and hereditary peculiarities; the period of infancy, and from the age of forty upwards; high living; sedentary habits; rheumatic and gouty diathesis. *Exciting*.—Cold; blows and injuries to the loins; parasites (p. 624); dyspepsia; the use of water containing calcareous matters; acescent fruits. In the case of the oxalate of lime gravel, an excess of saccharine matters, and vegetables and fruits containing oxalic acid; organic disease of the kidney or bladder.

TREATMENT.—This varies with the species of gravel discharged.

In the uric or lithic acid gravel, a diet chiefly vegetable, and in extreme cases entirely so, with total abstinence from fermented liquors and wines; diluents; the alkaline bicarbonates, of which the bicarbonate of potash is to be preferred, in doses of grs. x. to ℥ss.* taken in a tumbler of cold water an hour before meals, three or four times a day, so long only as the urine has an acid reaction; or the alkaline aerated waters of Vichy and Carlsbad.

When the phosphates are deposited, a more generous diet is admissible, with a moderate allowance of wine, and the dilute mineral acids (the nitric, muriatic, or nitro-muriatic acid), should be given at short intervals. When the phosphatic diathesis has been brought about by exhaustion of mind or body, opium is indicated, and often proves extremely serviceable.

In the oxalic acid diathesis (for urine containing oxalate of lime is generally bright and clear, and the gravel is only to be detected by the microscope), the alkaline carbonates are indicated. All articles of food containing oxalic acid should be avoided, and saccharine substances should be taken in moderation, or, in extreme cases, disallowed. The patient should use soft water. Nitromuriatic acid, in combination with bitter infusions, is serviceable when the disease has its origin in atony of the stomach.

* ℥i. = 100 grains.

In all forms of gravel, strict attention must be paid to the general health ; to the functions of the skin, to the avoidance of sudden changes of temperature, and to the state of the digestive organs. Warm bathing is beneficial by promoting the action of the skin. Due attention should also be paid to the state of the bowels. Symptoms supervening on gravel must be treated by the remedies appropriate to such symptoms occurring independently of it.

In the severer forms of the disease constituting renal calculi, the treatment must be directed to relieve the pain and facilitate the passage of the calculus.

TREATMENT.—To relieve the acute pains, a full dose of opium (two or three grains), or an equivalent dose of laudanum, or of morphia should be given; or when the stomach is very irritable, an opiate enema (ʒi. of laudanum in four ounces of gruel) or a suppository (two or three grains of solid opium). A warm bath, followed by fomentations to the abdomen and loins, should also be prescribed, and if the pain be extremely acute, chloroform may be inhaled and leeches applied to the loins.

The medical treatment of *calculus in the bladder* will depend upon the nature of the gravel voided by the patient.

HÆMATURIA—BLOODY URINE.

SYMPTOMS.—An evacuation of blood in the urine.

CAUSES.—Congestion of the kidney, or any portion of the mucous membrane of the urinary organs, idiopathic, or produced by cantharides, turpentine, &c.; nephritis; calculus in the kidney, ureter, bladder, or urethra; blows on the loins; diseased prostate; chronic inflammation or ulceration of the mucous membrane of the bladder; villous tumours or malignant fungous growths from the mucous membrane. Sometimes hæmaturia occurs in the course of purpura nautica, or purpura hæmorrhagica; and at the close of severe febrile affections, accompanied by typhous symptoms. The strongylus gigas, a nematoid worm, is a rare cause of hæmaturia. In the West Indies, Egypt, the Mauritius, Natal, and Cape of Good Hope, hæmaturia is endemic, and its cause in some of these countries has been traced to the presence of animal parasites in the urinary organs.

DIAGNOSIS.—Bloody urine is of a bright-red or dark-brown colour, and if the quantity of blood be considerable, a dark-brown deposit, or distinct coagula are formed. For the chemical and microscopical characters, see Part I., pp. 140 and 152. When the secretion is acid, and the blood is in very small quantity, the urine has a smoky appearance.

The source from which the blood flows may sometimes be inferred from the accompanying symptoms, and a careful examination of the urine. If the hæmorrhage be preceded by pain in the region of the

kidney, if the blood be equally diffused through the urine, and if, when examined by the microscope, the secretion be found to contain casts of the urinary tubes (see Part I., p. 152), the blood has come from the kidney. When the first quantity of urine discharged from the bladder is little, if at all, tinged with blood, and the remainder consists of blood or urine highly tinged with blood, there is a strong presumption that the hæmorrhage is from the bladder, especially if symptoms of stone are present. When the blood flows from the urethra without discharge of urine, the urethra is the source of the hæmorrhage.

TREATMENT.—This must be determined by the existing complications, or probable causes of the hæmorrhage. If the disease be the consequence of injury, or the patient be of a full, plethoric habit, bleeding, or cupping of the loins, rest, and gentle aperients will be required. If it arise from irritation of the kidney by calculus, together with the remedies proper for that disease, frequent draughts of mucilaginous liquids, as thick barley-water, solution of gum acacia, decoction of marsh-mallows sweetened with honey; opium; and copious emollient clysters should be prescribed. If the blood coagulate in the bladder, and give rise to difficult micturition, the catheter must be used, and injections of warm water, decoction of marsh-mallows, or of poppies must be resorted to.

When the hæmorrhage is excessive, cold water, or a cold solution of alum (℞i.* or ℞ii. to the pint) may be injected into the rectum. At the same time the vegetable astringents, such as pomegranate, logwood, uva ursæ, kino, catechu, gallic acid, or the extract of *Krameria*, may be given by the mouth. Acetate of lead in combination with opium, and the tinctura ferri perchloridi are of service.

ENDEMIC HÆMATURIA.

One of the above-mentioned causes of hæmaturia is so widely prevalent amongst the inhabitants of certain regions that it requires separate consideration. Hæmaturia is known to be endemic in the West Indies, in Egypt, in the Mauritius; and I have lately† called attention to its existence in Natal and in certain parts of the Cape of Good Hope, viz., at Uitenhage and Port Elizabeth.

Dr. T. Bilharz, of Cairo, has shown that the hæmaturia and gravel (lithiasis) so common in Egypt is due to the presence of a nematoid worm, which has been variously termed *Distomum hæmatobium*, *Gynæcophorus hæmatobius*, and *Bilharzia hæmatobia*. It is a minute white worm, less than half an inch long. In fig. 72, the female (A B C D) is represented partly lying within the gynæcophoric canal of the male (C); the eggs (E) are considerably magnified. The parasite inhabits the veins of the urinary and portal systems, but more commonly those of the former, causing much congestion and hypertrophy of the mucous membrane of the bladder, ureter, and pelvis of the kidney.

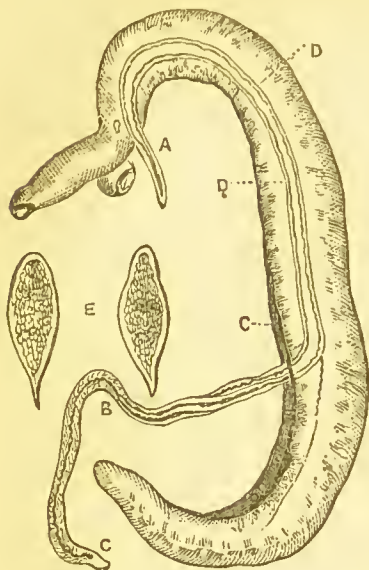
The hæmaturia of the south-east coast of Africa is due to the same or a closely-allied species of parasite. Only the eggs and ciliated embryo

* ℞i. = 100 grains.

† Medico-Chirurgical Transactions, 1864.

(fig. 73.), are at present positively known. There can be very little doubt that the disease prevalent in the Mauritius is due to the same animal.

Fig. 72.



The cause of endemic hæmaturia of the West Indies remains to be discovered.

SYMPTOMS.—The symptoms of the disease prevalent in South Africa and the Mauritius are the following:—The passage, with the last ounce of urine, of a little blood, rarely exceeding a tea-spoonful; or of, sometimes bloody, sometimes colourless mucus, moulded so as to resemble “veins.” These latter occasionally cause a little obstruction, and give rise to straining. When the parasite inhabits the kidney, an occasional smart twinge of lumbar pain is felt. The urine is clear and pale-coloured, the blood being rarely or never diffused through the bulk of it. After exertion the quantity of blood

is increased. During the earlier years of the disease no other pain or inconvenience is experienced. The disease attacks both sexes at about the age of ten. My friend, Mr. Dunsterville, of Port Elizabeth, informs me that two out of every three schoolboys are affected, and their linen is commonly blood-stained like that of the other sex from the menstrual discharge.

Adults, and occasional residents of certain localities in the Cape and Natal, are also liable to the attacks of the parasite.

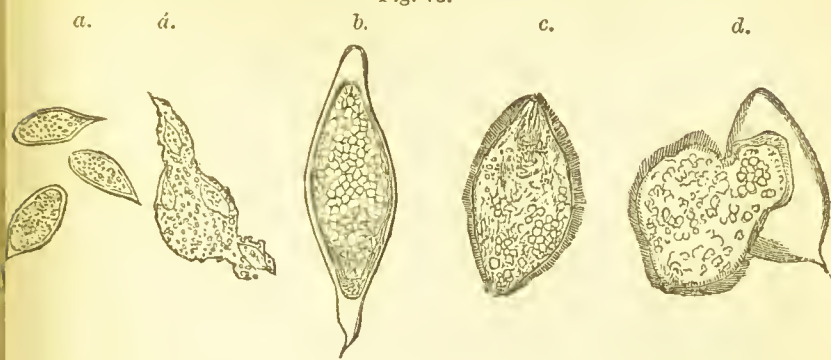
After a few years the hæmaturia gradually declines, and, as a rule, entirely disappears at the age of puberty; but the cause, as manifested by the presence of ova in the urine, persists, and sooner or later gives rise to severe symptoms of gravel. The urine assumes a highly saline condition, and crystalline deposits, which, so far as my observations extend, are chiefly composed of oxalate of lime, form around the ova which the parasite produces in great abundance. The eggs thus become the nuclei of renal calculi.

DIAGNOSIS.—The presence of the characteristic ova *a b* (fig. 73), in the urine. They measure the $\frac{1}{170}$ th of an inch long, and the $\frac{1}{400}$ th broad, and are strongly acuminate. The colourless or bloody mucous casts, *a*, frequently contain scores of these ova. Occasionally the ciliated embryo *c* may be observed; *d* represents this first state of the animal escaping from the egg.

CAUSE.—The introduction of the parasite in the form of the ciliated embryo, or in that of its next stage of development into the stomach,

by means, probably, of the drinking water in use, or of certain water plants or salads.

Fig. 73.



PROPHYLAXIS.—The use of filtered or boiled water, and prevention of the contamination of the streams by the urinary products of individuals suffering from the disease. With a view to the prevention of the disease it should be determined whether the lower animals are affected with the parasite.

TREATMENT.—This must be directed, I. To kill or expel the adult sexual parasites. II. If our efforts to do so be unavailing, to secure the regular expulsion of the ova which, so long as they remain in the body, may at any time become the nuclei of urinary calculi. The success which attends the treatment of intestinal parasites leads one to hope that some specific may be found against the Bilharzia which in its after consequences is a most painful associate, and liable to prove a dangerous one also. But the case of the urinary parasite is very different from that of the intestinal. The Bilharzia is not simply attached to the free surface of the mucous membrane but lies within orifices of the smaller veins; and the substances which pass through the kidney on their way out of the system are very few compared with those which find a more direct passage through the intestinal canal. It appears, therefore, that we must either sufficiently saturate the blood with a remedy poisonous to the parasite, or lead through the kidneys some substance which may prove hurtful to it. The aromatic diuretics, such as turpentine, copaiba, cubebs, bucco, &c., give some promise. Santonine being an anthelmintic which becomes diffused in the blood, is worthy of a persevering trial. I have found that a draught composed of ℥xv. each of oil of turpentine and male fern, with ℥v. of chloroform in f ʒij. of tragacanth mixture, given every morning, brought away great numbers of the ova. The saline condition of the urine is much diminished, and the renal irritation and pain due to the presence of crystalline concretions are much relieved by the administration of bicarbonate of potash in copious draughts of water. The alkali dissolves the cementing medium, which is usually, I believe, uric acid, and so causes the disintegration of the calculi, and prevents their formation. (J. H.)

ISCHURIA RENALIS—SUPPRESSION OF URINE.

SYNONYM.—Anuria.

SYMPTOMS.—Languor, restlessness, a sense of weariness and weight in the loins and lower extremities, frequent pulse, heat of skin, flushed face, headache, nausea, and vomiting. These symptoms are followed about the third day by drowsiness and œdema of the face, or by anasarca of the limbs and entire body. About the fourth day, epileptiform convulsions, often very violent and frequently repeated, come on, and after three or four attacks the patient falls into a state of profound coma, and then dies. At the onset of the disease, a small quantity of muddy urine may be voided: but when the disease is fully formed, there is complete suppression.

In some cases, there is no pain in the loins, and no fever, but there are slight nausea and drowsiness. During the second or third day the patient becomes comatose, and dies in from 24 to 30 hours. In other cases, the kidney continuing to secrete urine, the bladder is empty from some mechanical obstruction in the ureters. In these cases the disease sets in with excruciating pain, which at length subsides; and the patient becomes drowsy and dies comatose.

CAUSES.—Pre-existing disease of the kidney, excited into activity by blows or falls, or exposure to wet and cold. The action of certain poisons, as digitalis, arsenic, corrosive sublimate, and cantharides. Acute inflammation of the kidney. Mechanical obstruction in the ureters. The infectious fevers.

DIAGNOSIS.—From *retention of urine* by the empty state of the bladder as ascertained by the hand, and by the use of the catheter.

PROGNOSIS.—The disease is fatal, if it does not soon yield to remedies. In persons of advanced age, long subject to urinary disorders, the prognosis is extremely unfavourable.

TREATMENT.—*Indications.* I. To promote the elimination of urea. II. To re-establish the urinary secretion. III. To relieve the cerebral symptoms.

1. By copious purging and diaphoresis, gr. i. of elaterium, or ℥ii. of croton oil should be given immediately, and the patient exposed to a hot-air bath. Acetate of ammonia, combined with tartarized antimony, should subsequently be administered.

II. If acute nephritis be present, $\frac{3}{x}$. or $\frac{3}{xx}$. of blood may be taken from the arm, or the loins may be cupped or leeches, and hot stimulating fomentations subsequently applied.

When symptoms of suppression come on in the later stages of Bright's disease, or in gouty persons, powerful diuretics, such as cantharides and turpentine, may be administered.

III. The head symptoms must be treated by blisters to the forehead and nape, and if the head be hot a bladder of ice should be applied to the vertex.

DIABETES—IMMODERATE FLOW OF SACCHARINE URINE.

SYMPTOMS.—The first symptom that attracts attention is frequent micturition. The urine, on being examined, is found excessive in quantity, of a pale straw colour, of a peculiar faint odour resembling hay, of a sweet taste, and containing sugar in greater or less quantity. There is inordinate appetite, generally accompanied by dyspeptic symptoms; excessive thirst; and constipation, the stools being dry and hard. The tongue is clammy, and red at the edge, or clean, or white with a brown streak down the middle; the gums are red and tender; the throat dry; the breath has often a sweetish odour, like that of hay; and the skin is dry, harsh, and scaly. The patient is weak, and loses flesh. The mind is generally affected, the power of attention being weakened, and the disposition becoming anxious, sad, and irritable. After the disease has continued for some months, or even for several years, the symptoms continuing to increase, the emaciation becomes extreme, and the patient either dies exhausted, or falls a victim to some organic disease. Diabetes is often preceded by cutaneous affections, and accompanied by carbuncles.

In some cases the sugar occasionally disappears from the urine and reappears after a variable interval. Sugar is frequently present in small quantity in the urine of old people, without producing injurious effects.

Sugar sometimes disappears & is replaced by inulin, then sucrose, but (inosite) appears - Kii

PATHOLOGY.—M. Bernard has demonstrated the following facts:—
I. That in a recently killed animal, sugar invariably exists in the blood of the hepatic veins, and is absent from that of the portal veins. II. A substance (*glycogen*) may be artificially separated from the liver, which under the influence of saliva, pancreatic fluid, blood, liver tissue, &c., gives the reactions of grape sugar. III. Glycogen is formed with equal facility and abundance when the food consists of nitrogenized matters only, saccharine or starchy articles of diet being unnecessary for its production.

From these facts Bernard infers that sugar is formed in the liver during the healthy process of assimilation; that it passes out of it into the blood of the hepatic veins; and is carried to the lungs, where it undergoes oxidation and conversion into carbonic acid and water, which are eliminated as such from the lungs.

According to this theory, the liver and lungs have a reciprocity of function in the generation and destruction of sugar; and the most obvious explanation of the appearance of sugar in the urine is, that the reciprocal actions of these two great glands become disproportionate the one to the other. Thus, under certain abnormal conditions the liver may generate a larger amount of sugar than could be destroyed in a single circulation through the lungs, and the result would be that sugar enters the general circulation, and is separated therefrom by the kidneys. Again, when only a normal quantity of sugar is separated by the liver, disease or functional derangement of the

lungs may render these organs inadequate to perform their sugar-destroying function, and thus, as in the former case, the saccharine matter would pass into the general circulation.

According to Dr. Pavy, however, glycogen is not normally converted into sugar in the liver. He supposes that its natural destination is fat, and that it only undergoes metamorphosis into sugar when the function of the liver is disturbed as in diabetes. He believes that the metamorphosis of glycogen into sugar is the result of changes which immediately commence after the death of the animal. He bases this conclusion upon a frequently-repeated observation, that the blood of the right side of the heart of a living animal does not contain more than that trace of sugar which can be found in the left side of the heart. It appears, therefore, that we must look upon the generation of sugar in the liver as a result of derangement or perversion of the function of this gland. Amongst the circumstances which produce this specific derangement are irritations of the pneumogastric nerve and brain.

Thus Dr. Bernard induced diabetes by irritating the pneumogastric nerve at its origin in the floor of the fourth ventricle; and Dr. George Harley effected the same result by the irritation of the peripheral branches of the same nerve. Dr. Goolden observed that diabetes was a frequent result of blows on the head; and we have had several opportunities of convincing ourselves of the accuracy of his observations.

It is indeed possible that the digestive function may be at fault. The starchy constituents of food we know are at once converted into sugar by the salivary and pancreatic fluids; and although no such change affects, in the healthy state, the nitrogenized constituents of food, Mr. M'Gregor has shown ('Med. Gaz.,' 1837) that sugar was formed in the stomach of a diabetic patient during the digestion of animal food. It is very probable that the gastric fluid separated from the saccharine blood was in this case the source of the sugar. (J. H.)

MORBID ANATOMY.—The kidneys vascular and hypertrophied; occasionally they present the granular degeneration. Tubercular deposit in the lungs; shrunken condition of the brain.

COMPLICATIONS AND SECONDARY DISORDERS.—Pulmonary phthisis is the most common complication; granular degeneration of the kidney; peritoneal inflammation; anasarca; apoplexy.

PROGNOSIS.—*Favourable.* The intermittent form of the disease: a short previous duration; urine not exceeding 12 pints in quantity and 1036 in density; the emaciation not considerable; the appetite and thirst not inordinate; the skin still soft and moist; and the mind not much depressed. When the patient is under treatment, the signs of improvement are, a decrease in the quantity of the urine, without increase of density, steady diminution in the quantity of solids discharged, increase of weight, diminished appetite and thirst, the mind becoming clearer and more cheerful, and the body stronger and more active.

Unfavourable.—Prolonged duration of the disease, great emaciation, prostration of strength, urine in large quantity and of high density, the

solids discharged greatly exceeding the solids contained in the food, intense thirst, inordinate craving for food, the supervention of pulmonary or renal disease, great and sudden prostration of strength.

CAUSES.—*Predisposing.* Hereditary predisposition. *Exciting.*—Intemperance; abuse of the sexual function; distress of mind; injuries of the head.

DIAGNOSIS.—Excessive diuresis is the first and most prominent symptom: 8 gallons of urine are sometimes voided in the 24 hours; 2 gallons is about the quantity usually excreted. The specific gravity is very high, ranging between 1030 and 1070. It is sweet to the taste, and after evaporation, leaves a white powder or sticky residue. On examination this is proved to be sugar. The quantity of this substance passed in the 24 hours varies from half a pound to three pounds. For the mode of detecting sugar in the urine, and of ascertaining its quantity, see Part I., p. 146.

TREATMENT.—*Indications.* I. To improve the digestion. II. To diminish, as much as possible, the sources whence sugar can be supplied to the urine. III. To diminish the secretion of urine. IV. To relieve urgent symptoms.

I. For the fulfilment of this indication, see Dyspepsia.

II. The second indication is fulfilled by a strict regulation of the diet, which should consist principally of animal food, broiled or roasted, with a small quantity of stale and well-fermented bread; and liquids in moderate quantity: of which the best are weak beef or mutton tea, milk, pure spring water, or water holding calcareous salts in solution. Gluten and bran bread may be substituted with advantage for common bread. The liver indeed readily converts albuminous substances into sugar; but when the diet is restricted to azotized food, the symptoms undergo considerable diminution.

III. The third indication is answered by reducing the quantity of liquid, by forbidding the use of spirituous liquors, and of saline aperients; in fact, of all articles of diet or medicine which have diuretic properties; by increasing the secretion of the skin, by warm baths, Dover's powder, friction, and warm clothing; by opium in repeated moderate doses, as five grains of Dover's powder, three times a day; and by astringent remedies, such as sulphate of zinc, acetate of lead, and gallic acid.

IV. The intense thirst is best relieved by iced water acidulated with phosphoric acid. Claret is a suitable drink. The disease may be kept in check by the administration of ℞. — ℞l. tincturæ ferri perchloridi twice or thrice a day: and a full dose of opium at bedtime every other night. In one case Dr. Watson attributed the benefit conferred to the use of creosote. Constipation should be relieved by resinous purgatives; and debility, when extreme, by tonics and stimulants.

In one case which was under my care, a young female continued for months to pass large quantities of saccharine urine without losing flesh or suffering in health. She took no medicine, except a simple tonic

infusion, and continued, though not very strictly, a diet containing an excess of animal food. It is evident that no part of the sugar was formed at the expense of the structures of the body. So long as a patient does not lose flesh, it is probably inexpedient to adopt any other treatment. (G.)

CHYLOUS URINE.

SYMPTOMS.—The passage of opalescent or milk-like urine. Sometimes it has a faint pink tinge from the presence of blood. Occasionally the urine coagulates in the bladder and gives rise to retention. Otherwise the symptoms are very slight. In aggravated cases debility, loss of flesh, and pain in the loins constitute the general symptoms.

The urine is generally abundant, of a milky appearance, and varying in density from 1010 to 1020. After its discharge it sometimes coagulates into a white gelatinous substance, like blanc-mange, taking the form of the containing vessel. It more frequently retains the fluid condition, and separates after some time into a clear yellowish fluid and a white clot; at other times a white flaky matter is deposited; or a white cream rises to the surface. Examined by the microscope, the opalescence is found to be due to fatty matter in the molecular condition; small granular cells resembling chyle corpuscles, and sometimes a few red blood corpuscles are also observed. On analysis, the urine furnishes, in addition to its normal constituents, fat and albuminous matter.

The disease is of rare occurrence in temperate regions. It prevails endemically in the East and West Indies, Brazil, the Mauritius, and Bourbon.

TREATMENT.—Does not admit of removal; but it may be palliated by gallic acid, and the astringent chalybeates.

PATHOLOGY.—Dr. H. V. Carter's observations* lead him to the conclusion that the chyle obtains, by rupture of the walls of dilated lymphatic vessels, direct entrance into some part of the urinary passages. In three of his cases there was an accumulation of milky chyle in the enlarged inguinal glands. A very close connection appears to exist between hæmaturia and chylous urine. The diseases frequently coexist (Rayer), and Dr. Priestley relates a case ('Med. Times and Gaz.,' Ap. 18, 1857), in which the chylous urine was associated with hæmaturia in a native of the Cape of Good Hope. Further, hæmaturia and chylous urine are both endemic, *and both prevail in the same localities*. From what we know of parasitic hæmaturia (p. 624), it may therefore be inferred that in many cases at least of chylous urine, the communication between the lacteal and urinary channels is effected by the burrowing of parasites. In the last-mentioned case Bilharzia was probably the cause of communication. (J. H.)

DIURESIS—IMMODERATE FLOW OF URINE.

The passage of large quantities of watery urine is a direct result of the excessive use of fluids, especially of spirituous liquors. It also

* Trans. Med. & Physl. Soc., Bombay, N.S. for 1861.

occurs during functional irritation of the kidney, at the end of the hysterical fit, and after other mental agitation.

The term chronic diuresis is adopted by Dr. Watson to designate the condition which has been confusedly named *Diabetes insipidus*. The disease, or rather symptom of disease, consists in the excretion of large quantities of urine which only differs from that of health in containing more water, or more or less urea than normal. These variations have been significantly termed by Dr. Willis, *hydruria*, *azoturia*, and *anazoturia*, respectively. When the urea is in excess the specific gravity of the urine is unusually high. In the other varieties it is exceedingly low. The diuresis is commonly associated with thirst, some emaciation, and disorder of the digestive functions.

The treatment must be directed to the regulation of the cutaneous and gastric functions.

DISEASES OF THE BLADDER.

CYSTITIS	Inflammation of the Bladder.
ENURESIS	Incontinence of Urine.
DYSURIA	Difficulty in voiding the Urine.

CYSTITIS—INFLAMMATION OF THE BLADDER.

VARIETIES.—1. Acute; 2. Chronic.

1. ACUTE CYSTITIS.

SYMPTOMS.—Pyrexia; acute pain, swelling, and tension in the region of the bladder; pain and soreness, increased upon pressure above the pubes, or in the perinæum; frequent micturition; painful discharge of urine, in small quantities, or complete obstruction to its passage; tenesmus; vomiting.

CAUSES.—Mechanical injury; falls on the abdomen when the bladder is distended; local irritation by calculi; the inflammation of gonorrhœa extended along the urethra; spasmodic or permanent stricture; all the usual causes of inflammation; cantharides; stimulant urethral injections; cold (catarrhus vesicæ).

TREATMENT.—Depletion by the application of leeches to the perinæum, followed by a hot bath and fomentations, a brisk saline purgative combined with a full dose of opium.

The condition of the urine must be carefully determined. If it be hyperacid, alkalis; if alkaline, acids, in combination with opium, should be administered.

2. CHRONIC CYSTITIS—CYSTORRHŒA.

SYMPTOMS.—The discharge of an increased quantity of mucus with the urine, with slight symptoms of inflammation of the bladder.

CAUSES.—Diseases of the prostate gland, urethra, ureters, or kidney. Stone in the bladder. Ulceration or fungus of the organ. Re-

Obstruction to the flow of urine out of the bladder.

If the urine remain long in the bladder it undergoes decomposition; the urea assimilates four equivalents of water, and is converted into carbonate of ammonia, which sets up chronic inflammation, and the urine becomes bloody, and highly offensive.

PROGNOSIS.—*Unfavourable* in aged persons and the intemperate, especially when combined with paralysis, or extensive disease of the urinary organs.

TREATMENT.—In simple cystorrhœa the treatment consists in the use of remedies which act as stimulants to the mucous membrane, such as uva ursi, bucco, pareira, cubebs, copaiba, black pepper, &c. The irritable state of the bladder is relieved by emollient injections, such as decoction of marsh-mallows with laudanum, and by hot fomentations. The feet should be kept warm, and the patient ought to be protected against cold.

If the urine be ammoniacal, the mineral acids, in combination with opium, are the appropriate remedies. If it be bloody, offensive, and loaded with mucus, the bladder should be frequently washed out by means of the double-channeled catheter, with warm water slightly acidulated with hydrochloric or nitric acid. In cases of paralysis, the urine should be drawn off at least twice a day.

ENURESIS—INCONTINENCE OF URINE.

Incontinence of urine may arise from mechanical causes, or from functional derangements of the bladder. The former class of cases falls under the care of the surgeon; the latter comes within the province of the physician.

CAUSES.—Incontinence of urine, without organic defect, may arise from one of two causes: from violent contraction of the muscular coat of the bladder, the sphincter possessing its usual power; or from relaxation of the sphincter, the muscular coat of the bladder retaining its contractile power. In the first case, there is generally some source of irritation within the bladder itself, the urine being hyperacid or containing acicular crystals of uric acid; but in rare instances the muscular fibres are thrown into a state of spasm without obvious cause. The first form of disease is most common in males; the second in females and young children.

TREATMENT.—In incontinence of urine arising from spasm of the muscular coat of the bladder, the most effectual remedies, in the absence of gravel, are narcotics or sedatives, administered by the mouth, or introduced into the rectum, in the form of suppository or enema. A grain of solid opium as a suppository, or half a drachm of laudanum in a starch injection, will generally succeed in relieving the spasm. If a highly saline condition of the urine be the cause of the incontinence,

the remedies appropriate for the particular condition (see Gravel) must be employed.

In incontinence of urine arising from debility of the sphincter, two or three drops of tincture of cantharides, with ten drops of tincture of hyoscyamus, increased gradually and cautiously, rarely fail of removing the disease. I have had several cases of this kind, which have received immediate benefit and a speedy cure from this mode of treatment. In one case, occurring in a young adult, after cantharides had failed, tinctura ferri perchloridi in the dose of ʒss. three times a day, effected a speedy cure. (G.)

When the urine is perfectly retained during the day, and voided only at night, the disease is rather the effect of habit or sloth, or the result of dreams, than of any debility of the sphincter muscles: and here it may be necessary to resort to other means, such as preventing him from drinking liquid in the evening; threatening punishment; or, if all other means fail, keeping up a certain degree of pressure upon the urethra by means of a bougie bound along the under part of the penis, or of an indiarubber ring.

DYSURIA—DIFFICULTY IN VOIDING THE URINE.

Dysuria may exist in every degree, from slight and momentary arrest of the flow of urine, with or without pain, to complete retention. Some degree of pain generally attends the abortive attempts to discharge the urine, and in severe cases the suffering is intense.

CAUSES.—Long retention of the urine; acidity of the urine itself; irritation or inflammation of the coats of the bladder, whether originating in the bladder itself, or from causes external to it. Thus, dysuria is one of the symptoms of gonorrhœa, of inflamed prostate gland, of gravel, of urinary calculus, of cystitis and nephritis, of inflamed hæmorrhoids, of inflammation of the rectum, or irritation of it by worms or scybala, of uterine affections, of pregnancy, &c. *Strangury*, an aggravated form of dysuria, is produced by cantharides and other strong irritants. Dysuria is also a symptom of hysteria, and may occur in nervous persons of both sexes. The mechanical causes are stone in the bladder, stricture of the urethra, abscesses in the perineum, prostatic tumours, displacements of the uterus.

TREATMENT.—This must depend on the cause. Of those external to the bladder, constipation is the most common; and a brisk purgative, or a proper course of aperients, will soon remove the disease.

Spasm of the muscular coat requires the use of the warm bath with opiate suppositories or enemata. When the spasm is of frequent occurrence, tincture of the muriate of iron in repeated doses, aided by the cold affusion to the pelvis and thighs, are indicated.

When the urine is scanty and acid, alkaline diuretics, and diluents will be required. Dysuria following long retention of urine is best relieved by the warm bath.

CHAPTER VI.

DISEASES OF THE ORGANS OF GENERATION.

AMENORRHŒA . . .	Suspended Menstruation.
DYSMENORRHŒA . . .	Painful Menstruation.
MENORRHAGIA . . .	Excessive Menstruation.
LEUCORRHŒA . . .	The Whites.
METRITIS.	Inflammation of the Uterus.
ULCERATION OF THE OS AND CERVIX UTERI.	
CANCER OF THE UTERUS.	
FIBROUS TUMOURS OF THE UTERUS.	
PELVIC HÆMATOCELE.	
DISPLACEMENTS OF THE UTERUS.	
OOPHORITIS.	
OVARIAN TUMOURS.	
GONORRHŒA.	
SYPHILIS.	
SPERMATORRHŒA.	

AMENORRHŒA—ABSENCE OF MENSTRUAL DISCHARGE.

SPECIES.—1. Amenorrhœa from organic deficiency; 2. Amenorrhœa from functional derangement.

1. ORGANIC AMENORRHŒA.

CAUSES.—Absence of the ovaries; disease or defective development of the ovaries; absence or defective development of the uterus or vagina.

TREATMENT, with a view to the establishment of the function, is of course useless in such cases.

2. FUNCTIONAL AMENORRHŒA.

VARIETIES.—1. Primary suppressed menstruation; 2. Amenorrhœa with plethora; 3. Amenorrhœa with anæmia or chlorosis.

1. PRIMARY SUPPRESSED MENSTRUATION.

The age at which menstruation occurs is very variable. In this country the discharge may appear as early as the tenth year, or as late as the twentieth. In the greater number of young women it comes on between the ages of fifteen and sixteen.

The discharge is preceded in most cases by the following symptoms: A little languor, flushing of the face, throbbing headache, and aching

pain in the loins. In some cases these symptoms are attended with well-marked pyrexia. After a few hours an oozing of thin non-coagulable dark-coloured blood of acid reaction appears. It continues for a variable period, usually three or four days, and then ceases, the whole quantity discharged being usually about six ounces.

In many cases the menstrual nîsus occurs and recurs with increasing severity every month without any appearance of the sanguineous discharge. Such are cases of primary suppressed menstruation.

TREATMENT.—When the above-mentioned symptoms come on, a brisk aloetic purge, followed by Potassæ nitratis gr. x., Spiritûs ammoniæ aromatici ʒss., Liquoris ammoniæ acetatis ʒj., Aquæ pulegii f ʒiss., a hot hip-bath, and the application, if the symptoms require it, of cold to the head. Strict attention must be paid to the general health in the intervals. Moderate exercise should be taken. Fatigue and exposure to cold and wet must be avoided.

In the *chronic* form the menstrual nîsus is absent, and the general health is delicate. In such cases we may give chalybeate tonics, combined with stimulants, to improve the general health, and at suitable periods we may endeavour to elicit the menstrual flow by the exhibition of emmenagogues. (See formulæ.) If these fail, we may try the effect of electricity. The best emmenagogues are the remedies and modes of treatment which tend to restore the health and strength of the patient.

2. AMENORRHŒA WITH PLETHORA.

The general symptoms and constitutional treatment are those of plethora. (See Plethora, p. 283.) When blood is abstracted, it should be taken away at the approach of the menstrual period.

3. AMENORRHŒA WITH ANÆMIA OR CHLOROSIS.

For a description of the constitutional symptoms and treatment of anæmia and chlorosis, see Chronic Anæmia, p. 287, and Cachectic Anæmia, or Chlorosis, p. 288. The suspension of the menstrual discharge may be the first of the train of symptoms constituting anæmia and chlorosis; or it may make its appearance after symptoms of debility have already existed for a considerable period.

In addition to the general treatment laid down under Anæmia, it is sometimes necessary to prescribe measures for the restoration of the menstrual discharge. These are mentioned under the first variety of the disorder.

Amenorrhœa is sometimes accompanied by vicarious or supplemental discharges of blood, or of blood slightly altered from its usual character, from the nose, lungs, stomach, or rectum, and from ulcers of the skin. These discharges, if occurring in important organs of the economy, may require medical interference, and are best treated by leeching and purging, practised a little before the expected period of their occurrence.

The catamenia are normally absent during gestation and lactation. Some women, however, menstruate during pregnancy only. With others, the flow occurs at the regular periods during the process of lactation.

The *complications* of amenorrhœa, which are extremely numerous, must be treated by remedies appropriate to those complications, combined with such as restore strength to the system, and tend to re-establish the menstrual discharge.

DYSMENORRHEA—PAINFUL MENSTRUATION.

SYMPTOMS.—Pain in the loins preceding the menstrual period by a few hours or days; tenderness in the hypogastric region, and sometimes over a considerable extent of the abdomen; soreness or acute darting pains, resembling those of colic, and occurring mostly in paroxysms; vomiting; diarrhœa with tenesmus; dysuria. Nervous and hysterical symptoms are often present. These symptoms increase in severity until the appearance of the menstrual discharge, and then suddenly cease or gradually pass off. Severe cramp, with rigors and coldness of the surface, almost amounting to collapse, precede the flow in some cases. The discharge is often, but not always, scanty, and is sometimes accompanied by a tenacious secretion which takes the shape of the internal surface of the uterus.

CAUSES.—*Predisposing.* The rheumatic diathesis; the nervous temperament.

Exciting.—Sudden and violent emotions; increased determination of blood to the uterus; sexual intercourse immediately before the expected flux; constipation; spinal irritation; exposure to cold; mechanical obstruction to the evacuation of the discharge, from organic or spasmodic constriction of the cervical canal, or from retroflexion of the uterus.

PROGNOSIS.—*Favourable.* Most cases admit of cure, or of relief, by the improvement of the general health, and by proper local treatment.

TREATMENT.—*Indications.* I. To relieve urgent symptoms. II. To improve the general health.

I. The first indication is fulfilled, where there is plethora, by the application of leeches to the vulva, or cupping-glasses to the loins; by tepid, hot, or vapour-baths; by opium in full doses, or by laudanum and tartarized antimony in small doses, frequently repeated.

II. The second indication is fulfilled by a careful attention to the functions of the stomach and bowels, moderate depletion to meet any irregular determination of blood, and strict attention to the general health.

Organic impediments must be removed if possible. Stricture of the cervical canal may be relieved by the use of graduated bougies carefully introduced. Those composed of the fucus *Laminaria* are very serviceable.

MENORRHAGIA.—EXCESSIVE MENSTRUATION.

The menstrual flux may be considered as excessive, when it returns with unusual frequency, continues longer than ordinary, or is more abundant than is usual with the same person at other times. It may be the effect of two opposite states of the system:—plethora with inordinate arterial vigour (*active m.*); and general relaxation or debility (*passive m.*).

SYMPTOMS.—An immoderate flow of the menses, arising from plethora, is usually preceded by acute pains in the head and loins, a sense of heat, fulness and throbbing in the pelvis, turgid flushed countenance, universal heat, and a strong, hard pulse: when, on the contrary, the symptoms of debility prevail, the pulse is small and feeble, the face pallid, and the respiration short and hurried; there are dull aching pains in the back and loins, and in nervous persons the group of nervous symptoms described under *Mimosis Inquieta*. (See p. 292.)

CAUSES.—*Predisposing.* Plethora; a laxity of the womb from frequent parturition; displacement of the uterus; difficult and tedious labours, or repeated miscarriages; a sedentary and inactive life; heated apartments, and all causes of debility.

Exciting.—Violent exercise; blows or concussions; violent straining at stool; tight lacing; excess in venery, particularly during menstruation; the application of wet and cold to the feet; congestion or ulceration of the mucous membrane; the presence of internal tumours. Attacks of menorrhagia are common in women who have changed life some months or years previously.

PROGNOSIS.—*Favourable*, especially when caused by plethora; but when it occurs in persons much reduced by previous disease, or is produced by a laxity of the vessels of the organ, is profuse, long-continued, or of frequent recurrence, it will often resist treatment for a long time. When it arises from organic affection, the prognosis will depend upon the nature of the disease.

TREATMENT.—The treatment of menorrhagia consists in—

1. Reducing the febrile symptoms and the plethoric condition of the pelvic circulation by free purgation, gr. x. of colocynth and blue pill, followed by a dose of sulphate of magnesia in infusion of roses, with an excess of acid, and the addition of twenty drops of tincture of henbane.

2. When the febrile symptoms are subdued, astringent remedies, of which the perchloride of iron is the best, may be given three or four times a day, with the infusion of quassia. (℞. Tinct. ferri perchloridi ℥ xx. or ℥ xxx., Infus. quassiae ℥i.)

If the hæmorrhage be very profuse, cold water should be injected into the rectum and vagina. If this does not suffice, injections of alum or tannic acid must be used, and, if need be, the vagina must be plugged with sponges saturated with such solutions.

The patient should be directed to keep the horizontal posture on a hard mattress. The clothing should be light and the regimen cooling.

3. When symptoms of debility are present, tonics or stimulants, such as quinine or wine, must be given with or without the astringent remedies, and in combination with sedatives.

LEUCORRHŒA—THE WHITES.

DEFINITION.—Discharge of a milk-white or glairy mucous fluid from the orifice of the vagina.

VARIETIES.—1. Vaginal; 2. Uterine.

1. VAGINAL LEUCORRHŒA—VAGINITIS.

This is an uncommon form of the disease.

SYMPTOMS.—Pain and soreness, with a sense of heat and fulness or tightness of the vagina; vesical and urethral irritation, resulting in frequent micturition and more or less pain and dysuria; soreness and itching of the vulva; at first a thin colourless acid discharge becoming, in the chronic form of the disease, more or less creamy or purulent. The vagina is swollen and tender, and the mucous membrane, which is naturally of a pale rose-tint, is uniformly dark red, or presents patches of inflammation.

DIAGNOSIS.—There are no characters by which simple vaginitis may be distinguished from the gonorrhœal variety. The character of the patient and of her husband, if she be married, must decide the diagnosis. It must not be forgotten that some observers are of opinion that simple leucorrhœa may, by contact, induce both urethral discharge and preputial sores in the male. From the uterine variety of leucorrhœa, it is distinguished by the absence of inflammation of and discharge from the os uteri, by the thinner and more acid nature of the discharge, and by the circumstance that vaginal leucorrhœa is not increased before or after the time of menstruation. There is also an absence of uterine symptoms, and the health suffers less.

CAUSES.—Simple vaginitis results from vitiation of the natural secretions from constitutional derangements. It is often associated with excessive acidity of the urine: foreign bodies, *e.g.* pessaries in the vagina: violence in sexual intercourse: irritation of the rectum from piles or ascarides: exposure to cold.

TREATMENT.—*General*, saline alkaline aperients, and the hip-bath. *Local*, the removal of any sources of irritation which may be present: warm-water injections, and afterwards the injection of a solution of zinc (gr. v. to f̄ssj.), or the application, by means of a camel-hair brush, of a solution of nitrate of silver (gr. x. to f̄ssj.).

In the chronic form the most scrupulous cleanliness is required. Zinc or alum injections should be used twice a day; quinine or the astringent chalybeates should be prescribed.

2. UTERINE LEUCORRŒA—INFLAMMATION OF THE OS AND CERVIX UTERI.

SYMPTOMS.—The discharge of an inodorous white creamy fluid varying in quantity from a slight increase of the natural secretion to several ounces in the day, undergoing a considerable increase immediately before and after menstruation, and sometimes taking its place. There is pain and weakness of the loins, excessive debility, and a sense of bearing-down in the pelvis; the vagina is relaxed, and the os uteri lower down than normal; the cervix uteri is found swollen, and the os red, congested, patulous, and occupied by a glairy secretion like white of egg. As this passes down the vagina, it becomes altered by its acid secretion into a creamy fluid. The general health suffers in a marked degree: the appetite is lost or impaired; the bowels are constipated, or irritable; spinal irritation is often present, and there is pleurodyne, palpitation, and the nervous symptoms described under *Mimosy Inquieta* (p. 292). Pain in the left side is a very common, but by no means peculiar symptom in leucorrhœa.

CAUSES.—Inflammation of the os and cervix uteri; the discharge is derived from the extensive glandular surface which Dr. Tyler Smith has shown to line the canal of the cervix uteri.* Debility, suppressed menstruation, abortion, frequent parturition, lactation and congestion of the cervix uteri, all predispose to this condition.

TREATMENT.—*Indications.* I. To improve the general health. II. To arrest the discharge.

I. The general health may be improved by strict attention to diet, and to the state of the bowels, by regular hours, change of air, proper exercise, and cold bathing. The most useful remedy is steel in full doses or chalybeate waters; or a combination of tonics and sedatives.

II. In most cases, an alum or zinc injection is sufficient; in some instances, however, the stronger astringents may be necessary, as catechu, cinchona, oak-bark, tannin, or the rind of the pomegranate; and in others, solution of nitrate of silver (gr. xl. to ʒi. of water), applied with a camel-hair brush. Astringent lotions may be introduced into the vagina by means of a cylindrical pessary of sponge. When much irritability is present, opiate injections may be required; and if there be much congestion, or if there be signs of local inflammation, a few leeches may be applied to the neck of the uterus.

The remedies which act on the mucous membrane through the general system are cubebs, copaiba, cantharides, turpentine, alum, tannin, and uva ursi.

* "On Pathology and Treatment of Leucorrhœa."

METRITIS—INFLAMMATION OF THE UNIMPREGNATED UTERUS.

VARIETIES.—1. Acute; 2. Chronic.

1. ACUTE METRITIS.

SYMPTOMS.—Pain, increased by pressure, in the region of the uterus, and in the cervix on examination per vaginam; pain extending to the loins and thighs; dysuria; a sense of weight and bearing down; swelling of the abdomen and tympanites. These local symptoms are generally accompanied by fever, with nausea and vomiting; and sometimes there are symptoms of hysteria. In the most severe cases, there are slight delirium, drowsiness, extreme prostration of strength, diarrhœa, and subsultus tendinum. At first there is no vaginal discharge, but after a day or two, an abundant and often offensive, purulent, or muco-purulent discharge, occasionally tinged with blood, appears. The uterus is found slightly enlarged, and very tender to the touch, and the arteries of the cervix may be felt strongly pulsating.

MORBID ANATOMY.—The substance of the uterus inflamed and enlarged, œdematous, and softened: in severe cases, pus is infiltrated through its tissue; or an abscess is formed in it. Purulent matter may also be found in the veins in the pelvic cellular tissue, and in the folds of the broad ligament. The morbid appearances in the membranes of the uterus are those of inflammation of the serous and mucous membranes in other parts of the body.

CAUSES.—*Predisposing.* Those of inflammation generally. *Exciting.*—Suppression or diminution of the menstrual discharge from cold; the use of astringent injections; frequent sexual intercourse; extension of gonorrhœal inflammation; physical injuries; blows and falls; childbirth.

TREATMENT.—Depletion, by cupping to the loins, or by leeches to the vulva or groins; or a combination of calomel, opium, and tartar-emetic in full doses; local fomentations; the hip-bath; counter-irritation by mustard poultices or hot turpentine. Dysuria may be relieved by mucilaginous drinks, and the bowels should be kept free by gentle saline aperients, or by castor-oil.

2. CHRONIC METRITIS.

This is a common consequence of the acute form, when neglected or badly treated. It may assume a variety of shapes, and lead to a great number of severe structural lesions of the uterus, such as ulceration, suppuration, membranous inflammation, and enlargement and induration of the mucous follicles and muscular structure of the organ.

ULCERATION OF THE OS AND CERVIX UTERI.

VARIETIES.—1. Simple ulceration ; 2. Corroding ulceration.

1. SIMPLE ULCERATION.

SYMPTOMS.—Uterine leucorrhœa, occasionally tinged or streaked with blood ; pricking, darting, or throbbing pain in the situation of the os uteri ; great irritability of the bladder ; a sense of bearing down. The evacuation of the bowels, the sitting posture, and sexual intercourse usually increase the pain. The pain is increased immediately before the appearance of the catamenia, and is usually absent for a short time afterwards. The menstrual discharge is unusually profuse.

The os uteri is low down, swollen, and tender to the touch, and the hard and painful glandular tissue can be felt through the mucous covering. The cervix is enlarged, congested, and presents superficial ulceration on one or other side of the os, of variable extent. The ulcerations are depressed, and usually present healthy granulations. In chronic cases the granulations are angry-looking, and the edges of the ulcer thickened.

TREATMENT.—The *general* treatment will be the same as that for inflammation of the os and cervix uteri. (See Uterine Leucorrhœa.)

The *local* treatment consists in the use of mild zinc injections, and the repeated applications of a strong solution of nitrate of silver. When the cervix is within the patient's reach she may occasionally apply the Unguentum hydrargyri nitratis. If the ulcer be chronic and unhealthy solid nitrate of silver should be applied.

2. CORRODING ULCERATION.

SYMPTOMS.—Pain and weakness in the loins ; more or less localized pelvic pain and uneasiness, sometimes of an acute burning or cutting nature ; the passage of hardened *feces* gives pain ; at first there is leucorrhœa, subsequently a thin watery yellowish discharge, occasionally tinged with blood ; as the ulceration spreads, attacks of profuse hæmorrhage, which sometimes recur so often as to endanger the life of the patient. The finger detects a loss of substance ; the cervix is shorter or altogether absorbed, but the eroded surface is soft and rarely very uneven ; there is no induration about the edges or base of the ulcer, the whole surface of which has a pulpy feel. Pressure with the tip of the finger does not produce pain, but merely a sensation of soreness. The ulcer has a ragged excavated appearance, and is covered with ashy-grey debris ; when this is removed a raw bleeding surface is exposed. In severe cases the ulceration extends to the contiguous parts of the vagina. The fundus of the uterus is unenlarged, unaffected, and freely moveable.

The patient becomes anæmic and excessively debilitated from the repeated hæmorrhage due to the erosion of blood-vessels in the extension of the disease ; the health breaks down, and if the disease be not checked the patient dies of asthenia.

DIAGNOSIS.—From cancerous ulceration by the absence of induration, of acute pain on pressure, and of paroxysms of darting pelvic pain, by the mobility of the uterus and the limitation of the disease. In cancer the contiguous parts become indurated, and the uterus is fixed and immoveable. By the absence of the cancerous cachexia.

PROGNOSIS.—Unfavourable. If the disease come under treatment in the early stage we may succeed in arresting its further progress, and in some rare cases we may cure it.

TREATMENT.—Must be directed to improve the health by astringent tonics and nutritious food. To check the erosion by the application of caustics. These are strong nitric acid, the acid nitrate of mercury, nitrate of silver, and the actual cautery. The most efficacious is the actual cautery. When the eschar separates the caustic should be again applied if the surface do not present a granular appearance. If we succeed in producing healthy granulations, we may hope for a permanent cure by the repeated application of solution of nitrate of silver. The vagina should be frequently injected with astringent lotions.

CANCER OF THE UTERUS.

SPECIES.—1. Medullary; 2. Epithelioma (cauliflower excrescence).

1. MEDULLARY CANCER.

SYMPTOMS.—Deep-seated pains in the pelvis coming on in paroxysms. The pain is induced by any exciting cause, such as evacuation of the bowels or bladder, the recurrence of the menstrual period, sexual intercourse. The paroxysms gradually become longer, and the pain assumes a sharp neuralgic or lancinating character; the menstruation becomes irregular. Menorrhagia is an early and a prominent symptom. There is a sense of weight and fulness in the pelvis. The cervix feels enlarged and hard, the os uteri is patulous and its margins hard and deeply notched; pressure produces acute pain; the body of the uterus may be felt to be enlarged, and has lost much of its mobility. The os and cervix appear swollen, tense, and of a mottled red, or purplish colour; in many cases the mucous membrane retains its natural appearance. The indurated tissue soon begins to ulcerate and break down, and a watery, greenish, very fœtid discharge, occasionally tinged with blood, appears; and hæmorrhage now very frequently recurs. The enlarged cervix becomes soft and ragged, and the finger may be readily passed into the uterine cavity, the walls of which feel partly pulpy and partly nodular. The fundus is now found to be firmly fixed in a solid mass which surrounds it. The degeneration and ulceration sooner or later extend backwards, and involve the rectum, or forwards, implicating the bladder. The walls of both of these cavities are sometimes destroyed, and the contents commingle in the vagina with the uterine discharges, and are in part evacuated through the vulva. The health

of the patient rapidly declines, the stomach sympathizes and food is rejected, the cachexia and emaciation are extreme, and she ultimately dies, worn out by the excruciating pain and excessive discharges.

DIAGNOSIS.—The occurrence of hæmorrhage, and in the intervals a watery fetid discharge; deep-seated lancinating pain coming on in paroxysms; indurated enlargement of the os and cervix uteri; the fixation of the fundus, associated with emaciation and a sallow cachectic appearance are positive indications of the cancerous nature of the disease. Internal uterine tumours, and fibrous tumour of the uterus are distinguished from cancer by the absence of hardening and pain in the cervix, and of the fetid watery discharge.

TREATMENT.—In the early stage of the disease when the deposit is limited to the vaginal portion of the cervix, the removal of this portion by means of the *écraseur*. If the disease have passed beyond this stage, our treatment must be palliative only—the application of caustics does harm. The general treatment will consist in the exhibition of the chalybeate tonics, iodide and bromide of potassium, combined with tonic infusions. The pain and irritability of the stomach may be relieved by alkalies in a state of effervescence, combined with hydrocyanic acid. When the stomach will bear it cod-liver oil may be given to counteract the emaciation. The strength should be sustained by wine and light nutritious diet administered frequently, in small quantities. Sleep must be procured, and the uterine pain alleviated by occasional doses of opium. Opiate suppositories and injections may be employed with the same view. The vagina must be frequently washed out with warm water, to which a little solution of chloride of lime or permanganate of potash has been added, to counteract the fætor of the discharges. When the urine is discharged by the vagina, the most scrupulous attention to cleanliness will be required.

2. EPITHELIOMA (CAULIFLOWER EXCRESCENCE).

SYMPTOMS.—A copious watery discharge, occasionally streaked with blood, from the vagina; subsequently profuse florid hæmorrhage, induced by sexual intercourse, straining at stool, or any other direct cause of congestion or irritation; a rough villous insensible mass is felt attached to the os uteri at some part of its circumference; the tumour has a florid colour, and a granular or villous structure; when handled freely, it bleeds. Its growth is rapid, and it sometimes attains such a size as to occupy the whole of the vagina and protrude between the labia. The disease is limited to the uterus, and if removed it is speedily reproduced. The patient becomes rapidly debilitated by the loss of blood, and dies of asthenia.

DIAGNOSIS.—The structure and appearance of the tumour and its origin by a broad base from the os uteri are conclusive as to its nature.

TREATMENT.—The *general* treatment will consist in the exhibition of the astringent chalybeates in combination with the mineral acids: the

only efficient *local* treatment is removal of the tumour with the contiguous part of the cervix uteri by means of the écraseur, and the subsequent application of strong nitric acid, or the actual cautery, followed by astringent injections.

FIBROUS TUMOURS OF THE UTERUS.

Fibrous Tumours of the Uterus occur, I. As interstitial growths within the muscular walls of the uterus. II. As isolated fibrous or fibro-cartilaginous masses developed within the uterine walls, and projecting more or less from them. III. As pedunculated growths attached to the outer, or more frequently, to the inner surface of the uterus (*Uterine polypi*).

The *first and second variety* of these tumours often form enormous outgrowths from the uterus, sometimes weighing more than fifty pounds, and are accompanied by hypertrophy of its natural structure, with enlargement of its cavity. They are composed of white fibrous tissue, or of fibro-cartilaginous substance, and have very little vascularity. They are of gristly, and occasionally, from more or less perfect ossification of the cartilaginous tissue, of bony hardness. Their colour is greyish-white, and the section is pervaded by intersecting or concentric bands of white fibrous tissue. The first variety of tumour is continuous with the uterine tissue; the second, which is almost always composed of fibro-cartilage, is surrounded by a distinct areolar investment, which, by limiting it, allows of its ready separation from the contiguous uterine tissue. Usually there are more than one of these tumours. In projecting outwards towards the peritoneal cavity, or inwards towards the mucous surface, they sometimes become almost completely invested, in the former case with peritoneum, in the latter with mucous membrane, and so come to form large pedunculated growths. Cysts are occasionally formed in the interior of these tumours.

The *symptoms* which attend the development of the first and second variety of these tumours are precisely similar. They are usually so obscure, that the tumour attains a considerable size before it engages the attention of the patient, and she then supposes that she is pregnant, or the subject of dropsy. When the rectum or bladder are pressed upon, there will be frequent desire to evacuate the fæces and urine, and more or less difficulty will probably attend the acts. The menstrual function is sometimes interfered with, sometimes not. In the majority of cases the discharge is more profuse than usual, and it is apt to come on at irregular intervals; occasionally there is dysmenorrhœa. The os and cervix uteri are felt to be natural; but around and above the latter a hard rounded mass, filling up the sacral cavity, can be felt. If the other hand be placed upon the lower part of the abdomen, a large hard nodular mass may be tilted against it by pressing the tumour upwards with the finger. The uterine sound readily passes, sometimes in one direction, sometimes in another,

an unusual distance within the uterine cavity, proving that it has undergone considerable enlargement.

The general health is unaffected so long as the pressure of the tumour is insufficient to produce derangement of the contiguous viscera or blood-vessels.

Treatment.—The treatment of the first variety must be purely constitutional. With a view of reducing the tumour and preventing its further development, chloride of calcium, iodide or bromide of potassium, and the Kreuznach waters have been recommended. Pessaries composed of ℥i.* of mercurial ointment may be introduced into the upper part of the vagina.

Enucleation has been proposed for the second variety; but the operation has been attended with so large a proportion of fatal cases that we deem it unjustifiable. When self enucleation of the tumour has been nearly effected, we may facilitate its expulsion from the uterine cavity by dilating the os and cervix uteri and administering ergot.

The *third variety* of fibrous tumours, the pedunculated form attached to the inner surface of the uterus (*uterine polypi*), give rise to much more serious *symptoms*. These are leucorrhœa and hæmorrhage, which increase in severity and endanger the life of the patient. At first the menstrual periods are protracted, then the discharge becomes more profuse. In the intervals there is profuse leucorrhœa. After a time the regularity of the hæmorrhage ceases, and the patient is at last rarely free from sanguineous discharge, and a constant bearing-down or dragging sensation is complained of. On examination, the os uteri is felt low down, and patulous, and on passing the finger within the orifice a firm rounded projection may be felt, which can only be mistaken for the inverted fundus of the uterus. The *diagnosis* is readily effected by means of the uterine sound, which, in the case of the pedunculated tumour, proves that the uterine cavity is enlarged. In inversion of the fundus it is of course diminished. If the cervical canal be contracted it will be necessary to dilate it with a sponge tent in order to ascertain the existence of a tumour.

Treatment.—The only efficient treatment consists in the removal of the tumour. The os uteri having been dilated, the tumour must be seized with a hooked forceps and pulled downwards, and a ligature passed round the pedicle. Whenever it is practicable, the pedicle should be severed by the écraseur, or blunt scissors, so that it may be at once removed. The process of putrefaction, which follows ligature without subsequent removal of the tumour, is very liable to set up putrid fever and endanger the life of the patient.

* ℥i. = 100 grains.

PELVIC HÆMATOCELE.

SYNONYMS.—Uterine, peri-uterine, and retro-uterine hæmatocele.

Attention has of late years been called to the fact that during the intense vascular excitement to which the sexual organs are subjected at the menstrual periods, the congested vessels of the ovary or fibriated extremity of the Fallopian tube may rupture and lead to effusions of considerable quantities of blood into the saccular depression of the peritoneum known as the recto-uterine pouch. This accident of menstruation is most frequent between the ages of twenty and thirty, the period of greatest sexual vigour.

SYMPTOMS.—Usually after sudden suppression of the menstrual discharge, severe abdominal pain, undergoing increase at intervals, tenderness of the lower parts of the abdomen, difficulty and pain in micturition and defæcation; usually pain in flexing one or other thigh; there is increased fulness of the abdomen. The pelvic tumour differs much in size and situation. It usually bulges the posterior wall of the vagina, and tilts the body of the uterus forwards. It feels hard and solid. If all go on well, the pain and fever subside, and the blood begins to be absorbed. During this process, which is a slow one, there remains some difficulty in evacuating the contents of the bladder and rectum; there is a sense of weight and bearing down in the pelvis, and walking cannot be effected without pain or inconvenience. In some cases the effused blood sets up pelvic inflammation, and the clot, becoming imperfectly encysted, breaks down into pus. The abscess may burst into the vagina, the rectum, bladder, intestine, or into the peritoneal cavity.

TREATMENT.—If we suspect the occurrence of pelvic hæmorrhage, we should, in a plethoric person, take fifteen or twenty ounces of blood from the arm. If the condition of the patient will not bear so large a depletion, half a dozen leeches should be applied around the anus. A full dose of opium should be given, and subsequently the following—*Acidi sulphurici diluti* ℞xl., *Magnesiae sulphatis* ℞i,* *Tincturæ digitalis* ℞xv., *Infusi rosæ acidi* fʒj., every four hours.

The absorption of the blood tumour may be facilitated by mercurial and iodine infrictions, and the internal administration of iodide of iron. The greatest care must be taken to regulate the menstrual function, and the circulation should be relieved before each catamenial period by the administration of brisk hydragogue purgatives.

DISPLACEMENTS OF THE UTERUS.

The unimpregnated uterus is liable to downward, backward, and forward displacements, known respectively as *prolapsus*, *retroversion*, and *anteversion*.

* ℞i. = 100 grains.

PROLAPSUS, may be *partial*; or *complete*, when the womb protrudes entirely out of the vagina.

Symptoms.—A sense of bearing down; dragging pain in the loins; leucorrhœa. If the uterus be displaced suddenly, acute pain; fainting, and hæmorrhage.

Diagnosis.—From protruded pedunculated tumour, by the arrest of the uterine sound when passed aside of the tumour into the vagina. The finger or sound cannot be introduced beyond the prolapsed uterus, because the vagina is pushed down with it and inverted. The prolapsed uterus forms a pear-shaped tumour, the small end being directed downwards and presenting the orifice of the cervix. These characters distinguish it from the inverted uterus.

Causes.—Resumption of the erect posture too soon after parturition; debility, associated with leucorrhœa; severe chronic cough; straining; injuries to the perineum.

Treatment.—Tonics, astringent injections, and sponge pessaries, are usually sufficient for the relief of partial prolapse. A T bandage and suitable pessaries are needed in addition, in the treatment of complete prolapse.

RETROVERSION.—I. The womb may be altogether displaced, the fundus being directed backwards against the rectum, and the os forwards towards the symphysis; when the displacement is complete the organ lies horizontally across the pelvis. II. The position of the os and cervix may not be very much altered, while the fundus is bent downwards and backwards at the upper part of the cervix, so as to descend as low as the os and lie in the recto-uterine pouch: this condition is known as *retroflexion*.

Symptoms.—Sacral pain, sense of dragging in the groins and down the inside of the thighs, irritability of the bladder; metrorrhagia. The os uteri is found swollen and congested; it is low down and directed more or less forwards; behind it a firm round tumour can be felt through the posterior wall of the vagina, filling up the hollow of the sacrum and pressing upon the rectum. On tracing the cervix upwards from the posterior lip, the finger comes upon the angle formed by the body and neck of the uterus. The uterine sound passes but a short way if the concavity of its curve be directed forwards, but on rotating the handle, the instrument readily passes into the uterine cavity, and its point can be felt by the finger in the rectum occupying the interior of the retroflexed fundus.

The sacral pain is aggravated at the menstrual periods, and there is usually more or less dysmenorrhœa and menorrhagia.

Causes.—*Predisposing*. Abortion, constipation, retention of urine, laxity of the uterus, and of the round and broad ligaments. *Exciting*.—Straining; a false step.

Treatment.—Replacement with the uterine sound, after which the patient should lie in the prone position for some hours, and resume it daily for a time; astringent injections may be used; the bowels must be kept free; and all straining must be avoided.

In old standing cases it may be necessary for the patient to wear Dr. Simpson's uterine supporter.

ANTEVERSION is the rarest displacement of the uterus.

Symptoms.—Pubic pain; pain and irritability of the bladder; the os uteri is directed more or less backwards, and the fundus is felt through the anterior wall of the vagina just behind the symphysis. When the os uteri is not directed much backwards, there is dysmenorrhœa from obstruction caused by the bending of the cervix. The uterine sound only passes when the point is much curved forwards.

Causes.—*Predisposing.* Abortion, constipation. *Exciting.* Violent exertion; sudden jolting, as in riding.

Treatment.—Replacement with the uterine sound; the supine posture; purgatives; an abdominal belt.

OOPHORITIS—INFLAMMATION OF THE OVARY.

SYMPTOMS.—A dull, sickening, deep-seated pain in the groin, with tenderness of the corresponding iliac region. So long as the inflammation is confined to the ovary the pain is localized, but frequently it involves the contiguous peritoneum, and becomes diffused over the lower part of the abdomen, which is tumid and tender to the touch; the pain increases in severity, and radiates down the inside of the thigh, and extension of the leg renders it still more severe; nausea and vomiting come on, and the symptoms much resemble simple peritonitis; but on manipulation we shall have no difficulty in tracing the pain to its source deep in one or other of the iliac fossæ. The os and cervix uteri are usually very painful to the touch, not from inflammation of these parts but from transmission of the pressure to the inflamed ovary. On passing the finger alongside of the cervix, the exquisitely tender ovary may be felt through the wall of the vagina, lying in the direction of the sacro-iliac articulation. Whether we feel the ovary or not, pressure in this direction causes intolerable sickening pain.

CAUSE.—Acute suppression of the menstrual discharge, from exposure to cold.

TREATMENT.—A full dose of opium; leeches, applied to the groins, anus, or, still better, to the upper part of the vagina on the painful side; a hot hip-bath and a brisk purgative; hot fomentations to the abdomen. If there be signs of peritoneal inflammation, calomel and opium must be administered, so as slightly to affect the gums. The object is to re-establish the menstrual flow, and if this be effected the patient will be likely to do well subsequently. If the acute inflammation be neglected or improperly treated, we may expect that the disease will become chronic, of which condition, ovarian dysmenorrhœa, or cystic disease of the ovaries, will be the serious consequences.

OVARIAN TUMOURS AND DROPSY.

Ovarian tumours are almost invariably cystic growths.

From the nature of the changes which naturally attend the development and discharge of the ovum, no other organ in the body is so liable to cystic degeneration as the ovary. Indeed all the elements of such a morbid process are present at every menstrual period, which should warn us of the necessity of carefully regulating this important function.

The following varieties of ovarian tumour are found to occur:

1. *The simple cystic tumour*.—The ovary being distended into a firm, thick-walled cyst containing several gallons of fluid. The nature of the fluid varies greatly: it is usually a clear watery serum, or a thick brown grumous fluid, which when heated becomes solid.

2. *Compound ovarian cysts*.—In these the proportion between solid and fluid constituents varies; sometimes the cysts are very large, and separated from each other by very thin partitions; sometimes the cysts are small, and surrounded by thick walls of firm fibrous or vascular tissue. This latter kind of tumour has been named *Cystosarcoma*.

3. *Alveolar or colloid tumour*.—In this form the enlarged ovary is developed into innumerable minute cells, none exceeding an inch in diameter, filled with a glutinous jelly-like material.

4. *Cysts containing developed tegumentary organs*, such as teeth and hair.

SYMPTOMS.—The early symptoms are obscure, and attract little or no notice; suppression of the menses, or irregular discharge of the function, is one of the earliest symptoms; pain in the abdomen, referred to the side where the disease begins, is present in one-third of the cases; retention of urine, or difficult micturition, in about one-ninth; in one-third of the cases the tumour is discovered unexpectedly.* The tumour is always at first seated on one side. When it has attained such a size as to attract the patient's notice, symptoms due to its pressure on the contiguous viscera appear; there is pain or numbness extending down the corresponding leg. When the left ovary is affected the passage of fæces may be hindered; the state of the menstrual function does not afford any particular signs: usually there is more or less complete suppression of the catamenia.

As the tumour increases in size it distends the abdomen equally, and may then be mistaken—if it be mostly solid, for the pregnant uterus, a fibrous tumour of that organ, or cystic disease of the kidney (see p. 618); if it be fluctuant, for ascites.

OVARIAN DROPSY.

They are the first two varieties of ovarian tumour—namely, the monocystic and the polycystic, that give rise to ovarian dropsy. A dis-

* Dr. C. West, "On Diseases of Women."

inction between these varieties can generally be made by the extent of the fluctuation. In the case of the single cyst, a tap on one side of the belly produces distinct fluctuation on the other. This is not the case with a compound cyst; the partitions interrupt the fluctuation which is generated in any given cyst, and it can only be felt within its own limits. In either variety the most protuberant parts of the abdomen are dull on percussion, while the sides are more or less resonant. The belly does not swag to the sides when the patient lies in this position; the upward development of the tumour causes great divergence of the false ribs, and if the fingers be insinuated between their margin and the tumour, its tense rounded outline may be felt.

DIAGNOSIS OF OVARIAN DROPSY.—From the *pregnant uterus*, by the absence of fœtal sounds and movements, by the altered condition of the os and cervix uteri, and by no increase in the size of its cavity. From *ascites*, by the history of the case, which informs that the tumour commenced in the side. In ascites the tumid abdomen sways from side to side according to the position of the patient; its most prominent parts are resonant from air in the floating intestines, and the fluid effusion fails to produce that bulging outwards of the false ribs which is so characteristic of ovarian dropsy. In ascites the pelvic viscera are pushed down, and the uterus is low. In ovarian disease, the tumour rises out of the pelvis in its upward development, and drags the uterus a little way with it. Furthermore, some of the causes of ascites, such as an enlarged nodular liver, may be discovered.

The *distended bladder* has been mistaken for ovarian dropsy. So long as it forms a symmetrical pyriform tumour, this can only occur through gross carelessness; but an asymmetrical multilocular bladder may with more excuse be so mistaken. I have myself seen half a pint of urine drawn, by means of the trochar and canula, through the abdominal walls, from a distended bladder of this description. (J. H.)

TREATMENT.—If the tumour come under treatment early, and it be found to undergo increase and to be moveable, it should be extirpated forthwith. From the results of the operation of spaying in quadrupeds we infer how safely the removal may be effected in the early stages of the disease.

When the tumour has attained a great size, removal should not be attempted if, from manipulation and the history of previous attacks of pain and pyrexia, we infer that the tumour is adherent. In such cases, if the tumour be fluid we must resort to tapping as often as the pressure of the tumour interferes with the respiratory or digestive functions. Excision of a portion of the cyst wall, and the injection of solutions of iodine, have been successfully employed to procure inflammatory adhesion of the cyst walls and obliteration of the cyst in those cases in which the tumour cannot safely be removed.

With a view of arresting the growth of the tumour we must seek to improve the health of the patient, and administer the iodides or bromides of potassium, using, at the same time, infusions of iodine, mercury, or antimony.

GONORRHŒA.

DEFINITION.—A specific inflammation of the genito-urinary mucous membrane from impure sexual connection.

SYMPTOMS.—In men, about seven days after contagion, a tickling sensation at the orifice of the urethra and scalding pain along the passage in micturition; the orifice is red and swollen, and in the course of a few hours a thin discharge, quickly becoming thick, puriform, and of a yellowish-white colour appears. The passage becomes much swollen, and the stream of urine is diminished. Painful erections are liable to occur, and occasionally a little bleeding takes place after micturition. The prepuce is usually much inflamed and swollen, giving rise to phymosis or paraphymosis. If the body of the penis be implicated in the swelling, painful curving of the organ (*chordee*) is liable to take place during erection. In severe cases the inflammation extends backwards, to the seminal ducts, and thence along the vas deferens to the testicle; to the bladder; or to the uterus, producing severe inflammation of these parts. When orchitis supervenes the puriform secretion is altogether suppressed. In other cases, when suppression occurs, febrile symptoms set in, and severe ophthalmia or swelling of the joints (*gonorrhœal rheumatism*) appears.

In women the inflammation is usually confined to the vagina, and it is only when the urethra is implicated that much pain or inconvenience is experienced. When it extends to the uterus, severe symptoms of metritis (p. 640) appear.

DIAGNOSIS.—From simple urethritis and vaginal leucorrhœa, by the violence of the inflammation. *Donné* considers the presence of the ciliated animalcule the *Trichomonas vaginalis*, fig. 74 to be diagnostic of the specific vaginal inflammation; but it is often associated with other morbid conditions of the vaginal mucus.

Fig. 74.



TREATMENT.—In mild cases the administration of saline purgatives; injections of warm water followed by a mild lead or zinc injection. If the discharge do not cease after the pain and inflammatory symptoms have disappeared, the strength of the patient may be increased and *copaiba* or *cubebæ* given.

If there be much swelling and *chordee*, hot fomentations and the application of lint soaked in the *Linimentum belladonnæ*; to prevent the latter condition, a grain of opium in combination with camphor may be given at bedtime.

In many cases the discharge gradually decreases and degenerates into a colourless glairy secretion known as *gleet*. This discharge is very difficult to remove: it appears to be caused by a congested and debilitated condition of the mucous membrane of the urethra. In such cases *cubebæ*, *copaiba*, and *cantharides* are often very efficacious; weak solutions of nitrate of silver or perchloride of iron may be used subsequently.

SYPHILIS.

DEFINITION.—A specific disease, engendered by contact with a peculiar secretion from the generative organs.

SYMPTOMS.—After a variable period of incubation, usually from three to five days, the appearance of a pimple, pustule, crack, or abrasion upon the skin or mucous membrane of the genital organs. In the male the glans or the under-surface of the prepuce, and in the female the inner surface of the labia, are the parts usually affected. The pimple increases in size, and the base becomes red; usually the summit softens down into a thin purulent fluid; the cuticle gives way, and a minute excavated sore, destitute of granulations, is formed. The sore now begins to enlarge, and in two or three days it has attained the dimensions of a pea; it is perfectly circular, deeply and smoothly concave, being covered over with a smooth ashy layer of sloughy tissue. The ulcer is limited by an uniform smooth round narrow red ring, barely or not at all elevated above the surrounding surface. As the ulcer now increases in dimensions, the red edge becomes broader and elevated, and the surrounding tissue becomes indurated; minute rawish or pale granulations, partly covered over with ashy debris, spring up from the bottom of the ulcer and secrete a little ichorous, watery, or thin purulent discharge. The induration and elevation increase, and a well-marked indurated or “Hunterian” chancre is thus formed. Cracks and abrasions, if left to themselves, tend to the same condition. In some cases the pimple never becomes pustular, but undergoing enlargement and more or less induration, is converted into a characteristic red tubercle.

After a variable interval, secondary symptoms, indicating that the virus has been absorbed into the circulating fluids of the body, make their appearance. The earliest and most constant of these is bubo. One or more glands in the groin become slightly enlarged and sometimes very tender. The enlargement increases, and the affected glands attain the size of a walnut and become very hard. At first there is no inflammatory action in them, their surface is smooth, and they may be readily rolled about under the finger. They may remain in this condition for months; but usually inflammation, acute or chronic, supervenes. The gland enlarges, and, the surrounding areolar tissue being implicated, it loses its distinctness and free mobility. If the inflammation be acute, the integument becomes tense and red, and sooner or later fluctuation may be felt.

Another, and one that is amongst the earliest and most frequent of the constitutional symptoms, is ulceration of the mucous membrane of the soft palate and mouth. The ulcers are usually superficial, and appear as mere raw patches of abrasion, surrounded by slightly elevated rounded smooth margins, about which the epithelium has an opaque appearance. They occur on the inner surfaces of the lips, at the angles of the mouth, on the sides of the tongue, but chiefly on the arches of the soft palate and surfaces of the tonsils. In this last situation they are

apt to become excavated and ragged. Frequently the mucous membrane and submucous tissue of the larynx is similarly affected, and the voice becomes gruff and husky.

This condition of the mucous membrane is almost always associated with one or more of the following forms of cutaneous disease.

Syphilitic roseola.—After slight constitutional disorder, with headache, and, frequently, tenderness of the scalp, the trunk, limbs, and face become mottled with light mulberry-coloured blotches, not elevated, and disappearing on pressure. The epidermis is unaffected, and the spots are distinct, and shade off into an indistinctly circular circumference. This rash abides for a long time, and slowly disappears. It is, I believe, the first stage of the leprous affection. Its appearance is usually followed by rapid shedding of the hair, leaving the scalp almost bald for a time.

S. impetigo.—The favourite seat of this eruption is the scalp. Its appearance is preceded by pain and tenderness of the scalp. It commences as distant red circular spots, which become slightly elevated; exudation of muco-purulent fluid next takes place beneath the epidermis, and the spots are subsequently covered over with greenish scales. If these be removed, a little depressed irritable sore is exposed, upon which the scab reforms again and again. Ultimately they heal and leave minute scars. The eruption often appears on the face and other parts of the body. *S. ecthyma* and *rupia* are but increased developments of this form of disease, occurring in debilitated constitutions.

S. lepra appears first as roseola. The injected derma subsequently becomes thickened and elevated into a round copper-coloured "*S. tubercle*," or, if less elevated, it forms a slight tumid base, upon which the epidermal cells become dry and silvery, and thus constitutes *S. lepra* and *psoriasis*.

S. lichen.—Small, hard, conical, copper-coloured elevations, formed of the hypertrophied papillæ of the skin. They appear over all parts of the skin, and are often intensely irritable. Usually they remain dry and covered with scaly epidermis, but in debilitated conditions of the health they suppurate, under which form they may be described as

S. varioloid eruption.—The lichenous rash may have existed for weeks, or have preceded the pustular eruption but a short time. The papules exhibit first a little milky serum. In the course of about a week they are converted into well-formed acuminate, thick-set but discrete pustules, placed upon an inflamed, slightly raised, bright rose or copper-coloured base. They appear earliest, and in greatest numbers, upon the face, and later and more thinly scattered upon the trunk. A fortnight or three weeks may elapse before the whole of the pustules on the body have matured. The subsequent history of the pustule is much the same as that of variola; but the processes of squamation, desquamation, and absorption of the inflammatory products around the bases occupy a much longer time. Minute cicatrices, stained for a long time with a dusky brown colour, remain. When the eruption is

extensive and well developed, the patient presents the same general appearance as one covered with small-pox. On closer examination, the smaller acuminate pustules offer a ready distinction.

Such is the relationship which I would venture, from careful observation, to establish between the principal syphilitic skin diseases. (J. H.)

The skin and mucous membranes are not, unfortunately, the only structures affected by the syphilitic virus. Later on the serous and fibrous tissues are involved. The iris, retina, dura mater, and periosteum are all liable to syphilitic inflammation. The results—iritis, retinitis, epileptic convulsions, periostitis,—chronic and resulting in severe neuralgic pains, and nodes, or acute, and ending in necrosis—are what are usually classed as tertiary symptoms. The same poison induces similar morbid processes in the viscera. (See Diseases of the Liver.)

If personal cleanliness be neglected, and the discharges from the primary sores be allowed to excoriate the contiguous parts, condylomatous growth of these parts result. It is not uncommon in young females, who at first were ignorant of the nature of the disease, and when informed, were ashamed to apply for advice, to find the vulva, perineum, and margin of the anus covered with condylomatous growths, and the labia and clitoris themselves converted in large mis-shapen pendulous masses, the opposed surfaces of which exude an offensive ichorous fluid. Warts, and probably elephantiasis, have the same origin.

PATHOLOGY.—The primary effect of the syphilitic poison, when introduced into the blood, is a low sluggish form of adhesive inflammation, accompanied by the effusion of solid unorganized matter. Unlike the solid products of common inflammation, this material appears to be little susceptible, either of absorption or of conversion into fibrous tissue. Like tubercular matter, its tendency is to break down and produce unhealthy ulceration.

CONTAGION.—A person may become infected with syphilis in three ways:—1. By *absorption*; 2. By *inoculation of the discharge* from a chancre; 3. By *inoculation of the blood* of a person in whom secondary symptoms are present. The disease is commonly propagated by the first mode, the poison being absorbed during sexual intercourse through the delicate cuticle into the capillaries of the mucous membrane. If the cuticle be abraded the process is so far facilitated.

With regard to inoculation, M. Ricord has demonstrated that if a little of the secretion from a chancre be taken on the point of a lancet and introduced into any part of the skin of a person *free from constitutional syphilis*, a similar infecting chancre is produced there. The following is a description of its development. During the first twenty-four hours a little redness around the puncture; from the second to the third day the formation of a papular elevation seated on an inflamed areola or base; during the fourth day the development of a vesicle by the effusion of turbid fluid beneath the cuticle covering the papule; throughout the fifth day the effusion increases and becomes more or less purulent in appearance; the centre of the pustule is depressed, and the areola redder and swollen; during the sixth day the tissue around the

base of the pustule grows hard and feels elastic like fibro-cartilage. Subsequently the swelling, induration, and effusion increase, the cuticle gives way, and a scab forms. When this is detached the indurated chancre above described (p. 652) presents itself. If, however, the syphilitic virus have been previously absorbed into, *and be actually present* in the blood of an individual, inoculation of matter from an infecting sore on his own person, or on that of another individual, produces no effect. This non-production of a chancre around the point of inoculation is accepted as proof that the syphilitic poison already pervades the constitution (the blood) in any given case. It would appear that the constitution is infected on or about the fifth or sixth day of the development of a primary chancre, that is, at the time when the specific induration appears. If, therefore, the individual be inoculated before the fifth day with syphilis from the sero-purulent matter of his own developing chancre, or from any other source, an infecting chancre will be produced around the point.

As to the third mode of propagation, it has been satisfactorily demonstrated that inoculation with the blood of a person affected with secondary symptoms of syphilis will produce an infecting chancre. The disease has been transmitted in this manner by vaccination, the blood of a child suffering from secondary syphilis having become mingled with the vaccine matter derived from it. The result has been that the imperfectly developed vaccine vesicles have passed into the condition of indurated chancres. The fact is the more remarkable since the infecting child itself never had the primary disease.

Hereditary transmission of Syphilis.—Just as the *fœtus in utero* participates in small-pox when the mother is labouring under the disease, so may syphilis be transmitted from parent to offspring. Hundreds of sickly infants attest this painful fact. Several good observers consider it to be a well-established fact that the infection of the infant may take place independently of the existence of a chancre or syphilitic bubo in the mother during the time of gestation.

ORIGIN.—Some medical authors are of opinion that syphilis had its origin somehow in some very remote age, and that it has been transmitted by successive contact with infected persons to the present generation. When it has been proved that certain conditions, or combinations of circumstances, happened in remote ages, which are never repeated now, we may accept this hypothesis. At present it is more philosophical, and more in accordance with what we know of the origin of other contagious diseases, to assume that the virus is every day generated anew in large communities.

DIAGNOSIS.—The primary sore may be known by the ashy excavation or pale warty granulations of the surface, and by the elevated rounded circumscribed induration which surrounds and lies subjacent to it.

TREATMENT.—1. Local. 2. Constitutional. *Local.*—Before the end of the fifth day the primary sore admits of arrest and cure by the application of caustic, nitrate of silver, strong nitric acid, or caustic potash. When

the slough has separated, the ulcer may be dressed with black wash or calomel ointment. If the disease come under notice after induration has occurred, local treatment will be of no service. The sore must be kept clean and free from irritation, and constitutional treatment adopted.

Constitutional.—This consists in the exhibition of mercury in the form of calomel or pilula hydrargyri in small and repeated doses, combined, if bubo be present, with the infriktion of mercurial ointment into the groins until the gums become red, slightly swollen, and tender. No disease has a remedy more efficacious than syphilis possesses in mercury, and if the patient be carefully watched even stomatitis need not result from its use. Under its influence, the hard effused products melt away, the bubo disappears, and the ulcer assumes a healthy aspect and heals. When the constitutional effects of mercury have been thus induced, they should be kept up for a time by the occasional use of a little mercurial ointment.

When it is desirable to affect the system speedily, Mr. Henry Lee recommends calomel fumigation. He directs gr. xv. to gr. xxx. to be sublimed by the flame of a spirit lamp, which simultaneously evaporates a little water. The patient should be seated on a cane chair with the apparatus below him. The fumes of the calomel and the vapour of the water are retained in contact with his person by means of a blanket.

If the primary disease have been treated by mercury, secondary and tertiary symptoms, such as the cutaneous and periosteal affections and ulceration of the larynx, very readily yield to iodide of potassium, given in doses of from gr. iii. to gr. x. thrice a day. If mercury have not been used in the treatment of the primary disease, it will be necessary to exhibit it in combination with iodine. Gr. i. to gr. iii. Hydrargyri iodidi viridis, or gr. $\frac{1}{16}$ to gr. $\frac{1}{4}$ Hydrargyri iodidi rubri may be given in the form of pills thrice a day; or the latter may be combined with an excess of iodide of potassium, in solution of which it is soluble, and thus given in the form of mixture. In the severer forms of syphilitic skin disease occurring in debilitated constitutions, calomel fumigation often proves very efficacious.

Two other forms of syphilis remain to be described, viz. Infantile syphilis, and local syphilis.

INFANTILE SYPHILIS.—The child may be born apparently healthy. The first symptom which usually appears is inflammation of the nasal passages, resulting in a thick muco-purulent secretion, producing obstructed nasal breathing. This is popularly known as the *snuffles*, and the child is supposed to have a cold. It now becomes pallid and fretful, and rapidly emaciates. After about a fortnight an eruption of copper-coloured blotches appears around the anus, the adjacent parts of the buttocks, and on the lower extremities. After a time it appears on the other parts of the body, particularly about the folds of the neck and joints. The eruption consists of circular spots slightly raised and subsequently covered with thin dryish cuticle (*S. lepra*), and on the folds of the groin, and about the perineum it is apt to become moist and

excoriated, in which condition condylomata are liable to form. As the disease progresses, the intervening skin usually becomes copper-coloured, superficial ulcers appear on the inside of the mouth, the infant presents an extremely cachectic and emaciated appearance, and, if the specific remedy be not applied, soon dies of asthenia.

Treatment.—Gr. i. to gr. ii. hydrargyri cum creta twice or thrice a day, continued until the snuffles and rash have disappeared, and for two or three weeks afterwards. If diarrhœa be present, the mercurial should be combined with gr. $\frac{1}{2}$ to gr. i. pulvis ipecacuanhæ compositi. The unguentum hydrargyri ammoniati may be applied to the excoriations or sores.

LOCAL SYPHILIS.—Mr. Henry Lee recognizes four forms of primary syphilis, viz.: 1st, The indurated chancre; 2nd, The suppurating sore; 3rd, Ulcerative syphilitic inflammation; 4th, Destructive syphilitic inflammation.

The first form is that which has been already described as producing constitutional syphilis. The other three forms of the disease are, according to Mr. Lee, purely local, and, as such, never give rise to secondary symptoms, or require specific constitutional treatment. The secretion of each of these three forms may be artificially inoculated.

The suppurating sore “generally assumes a round form; when fully developed it often presents the same appearance as if a piece of skin had been removed by a circular punch. The borders are clearly defined, and often slightly undermined. The surface is tolerably smooth, and covered with ill-formed granulations. The base is somewhat thickened; but this thickening does not terminate in the abrupt way that the thickening around an infecting sore does, and it is generally much less in extent. The secretion is purulent after the first four or five days from the period of infection. The absorbent vessels and glands are not affected in this disease, which is strictly limited to the part that has received the infection.” (See Lee on Syphilis in Holmes, “System of Surgery,” vol. i. page 447.)

Ulcerative syphilitic inflammation is that form “in which the absorbent vessels play a prominent part.” A rugged, ill-conditioned, irritable sore on the genital organs is followed soon afterwards by pain and inflammatory swelling of one of the inguinal glands, which speedily suppurates. As soon as the pus is discharged the patient is relieved. The observation of a large number of cases enables Mr. Lee to say “that this ulcerative inflammation is not followed by constitutional syphilis.” (Op. cit. p. 451.)

Destructive syphilitic inflammation occurs under two forms, namely, sphacelus, and molecular mortification or phagedænic ulceration. In the first case the part to which the syphilitic poison has been applied dies before the virus has been absorbed into the surrounding tissues, and it is cast off with the separated slough. The second case is the more frequent one. In this, the contact of the syphilitic virus

results in the phagedænic syphilitic sore, which tends to spread in all directions, and cause extensive destruction of the tissues. As one part heals, another becomes livid and undergoes disintegration. The cicatrices are red and glazy, and are very liable to break down again.

SPERMATORRHŒA.

SYMPTOMS.—Involuntary seminal discharges, occurring either during sleep, or in the day-time, in the act of emptying the bowels or relieving the bladder, or soon afterwards, or during long journeys in carriages or on horseback, or after long sitting, and, in extreme cases, on the slightest friction or irritation of the genital organs. The constitutional symptoms are out of proportion to the loss of fluid sustained, and are due in part to the intimate relation subsisting between the sexual function and nervous system. They are those of *Mimosis Inquieta* (p. 292) combined with those of *Hypochondriasis* (p. 469). The patient suffers from indigestion, flatulence, and acid eructations. He is restless at night, listless, timid, and desponding during the day. He is subject to flushings of the face, headache, giddiness, noises in the ears, disordered vision, and other symptoms of cerebral congestion. The pupil is usually dilated. He suffers from palpitation and shortness of breath. He is easily startled by noises and readily irritated, and has various nervous feelings, as of cold water trickling down the back, or of ants crawling over the skin; or weakness and numbness of the hands. His memory fails, and his intellect grows weak; he hesitates, and often stammers in his speech. In the most severe cases, the patient's mind is still more seriously affected. His spirits are depressed; he is addicted to silence and solitude; is timid and morose; believes himself to be the object of plots and persecutions; grows weary of life, and is tempted to commit suicide; and, at length, becomes the confirmed victim of monomania or dementia. Among the occasional symptoms and consequences of this affection, are impotence, rigid contraction of the limbs, paralysis agitans, epilepsy, strabismus, amaurosis, bulimia, and nervous asthma.

CAUSES.—Sexual excesses; masturbation, pruritus scroti, dysenteric diarrhœa, ascarides, hæmorrhoids, fissures of the anus, and stricture of the rectum; natural phymosis, stricture of the urethra, varicocele, and inflammation of the urethra, testicles, or prostate; inflammation of the bladder; blisters, and cautharides taken internally; sleeping on the face.

DIAGNOSIS.—From urethral discharges; by these being continuous; from the prostatic secretion by the large quantity (a tea-spoonful, or more) of the discharge in spermatorrhœa. From all other discharges, in one class of cases, by the sensations attendant on them: in other cases, in the absence of such sensations, by the discharge following the

emptying of the bladder. Urethral discharges, and morbid secretions from the bladder accompany the first flow of the urine, or are blended equally with the whole discharge from the bladder. The fluid is identified as coming from the vesiculæ seminales by the physical and microscopic characters of the semen (see Fig. 26, p. 149). In one case which came under my notice, the patient mistook an abundant pale sediment of urate of ammonia (Fig. 15, p. 142), completely dissolved by heat, for semen. (G.) The urine alleged to contain semen should always be submitted to examination.

PROGNOSIS.—*Favourable* in those cases in which the discharge is nocturnal, and always preceded and accompanied by the usual sexual phenomena. Less favourable in those cases in which the discharge is diurnal, accompanying the action of the bowels and bladder. Least favourable of all when it is produced by slight causes affecting the state of the genital organs. Most favourable when traceable to mechanical causes in the rectum or urethra, or to skin diseases affecting the neighbouring parts.

TREATMENT.—In some instances the patient requires comfort more than medicine. As a general rule, the cases in which the emissions are nocturnal, and accompanied by the usual sexual phenomena, admit of cure by abstinence from any bad habits which may have caused them; by the avoidance of such trains of thought as provoke them; by sleeping on a hard bed, with a moderate supply of bedclothes; by securing a position on the side during sleep (by a handkerchief fastened to the wrist and side of the bed); and in extreme cases, by wearing at night a ring of soft leather a little exceeding the usual size of the penis, and armed with a few sharp points, so that the enlargement of the organ which precedes the discharge may be checked.

The treatment by medicines will consist in all cases of aperients regularly administered, to secure an open state of the bowels (aloetic aperients and hypercatharsis are contra-indicated), and such further remedies as are adapted to the existing state of the system. If nervous symptoms predominate, the treatment prescribed under *Mimosis Iuquieta* (p. 293); if the patient be pale and anæmic, the treatment proper to *Anæmia* (p. 285); if plethoric, that prescribed in *Plethora* (p. 284). If ascarides be present, the remedies for the removal of the same (see *Ascarides*). Piles require the treatment recommended at p. 585. If cutaneous eruptions near the parts of generation be the cause of irritation these will require the treatment proper to the particular skin disease. Prostatic disease, stricture of the rectum or urethra, and fissures and painful tumours on the anus, require the interference of the surgeon. The careful avoidance by patients suffering from this disease of the whole race of advertising quacks cannot be too strongly insisted upon.

CHAPTER VII.

DISEASES OF THE ORGANS OF SENSE.

1. Diseases of the Eye.
2. Diseases of the Ear.

DISEASES OF THE EYE.

1. CONJUNCTIVITIS . Inflammation of the Conjunctiva.
2. SCLEROTITIS . . Inflammation of the Sclerotica.
3. CORNEITIS . . . Inflammation of the Cornea.
4. IRITIS Inflammation of the Iris.
5. DISEASES OF THE CHOROID.
6. DISEASES OF THE RETINA.
7. DISEASES OF THE CHOROID AND RETINA.
8. DISEASES OF THE LENS.
9. STAPHYLOMA POSTICUM.
10. GLAUCOMA.
11. OTHER DISEASES AND DEFECTS OF THE EYE.

INFLAMMATION OF THE CONJUNCTIVA.

SPECIES.—1. Catarrhal Ophthalmia; 2. Purulent Ophthalmia of Infants; 3. Purulent Ophthalmia of Adults; 4. Gonorrhœal Ophthalmia; 5. Strumous Ophthalmia.

1. CATARRHAL OPHTHALMIA.

SYMPTOMS.—Redness and itching of the conjunctiva, lachrymation, slight intolerance of light, and stiffness of the globe of the eye, followed by pricking pain, the sensation of a foreign body (as a grain of sand) beneath the eyelid, and the adhesion of the eyelashes, especially on first waking in the morning. The inflammation begins in the conjunctiva of the lids, and gradually extends towards the cornea. It is evidently superficial, of a bright-red colour, and in the form of irregular clusters of tortuous vessels. In acute forms of the disease, the whole eye is covered with a vascular network, the secretion thickens, and becomes puriform or muco-purulent, and patches of extravasated blood are effused beneath the conjunctiva. If the disease extend to the conjunctiva covering the cornea, vision is obscured. There is no constitutional disturbance, beyond the slight feverishness attendant upon a common cold, when the disease is due to that cause.

CAUSES.—Catarrh; a draft of cold air directed on the eye; foreign bodies in the eye; over-exertion of the sight; the glare of a strong light; all the causes of inflammation in other mucous membranes.

DIAGNOSIS.—From *purulent ophthalmia*, except in severe cases, by its milder character, and by not being contagious. From *inflammation of the sclerotic*, by the brighter colour, larger size, and more tortuous course of the vessels, which are obviously superficial, and shift their place with the motions of the eyelids; by the abundant secretion; by the absence of acute pain in and around the orbit; and by the slight intolerance of light, existing chiefly at the onset of the attack.

PROGNOSIS.—*Favourable*. The disease readily yields to treatment, and, when confined to the conjunctiva, does not threaten the loss of vision. In chronic cases, or after repeated attacks, the lids may become thickened, and that part of the membrane which covers the cornea may be rendered opaque, so as to impair the sight.

TREATMENT.—If the disease depend on catarrh, and be attended with febrile symptoms, the treatment proper to catarrh must be employed. Dover's powder, in doses proportioned to the age (gr. x. for the adult), may be given at night, with a saline aperient in the morning; or small doses of tartar-emetic, in combination with a saline aperient, may be given two or three times a day.

The *local* treatment will consist, in severe cases, in the application of a blister, or few leeches to the temple, with fomentations of warm water or warm decoction of poppies. When the inflammation has in some degree subsided, and in mild cases from the first, collyria containing acetate of lead, sulphate of zinc, sulphate of copper, or nitrate of silver, must be prescribed. Of these, the last is to be preferred, in the proportion of two grains to the fluid ounce of distilled water. A large drop or two of the solution upon the globe of the eye at the outer angle twice or thrice a day. The eyelids must also be prevented from adhering during the night, by introducing a small portion of spermaceti or zinc ointment between them at bedtime.

2. PURULENT OPHTHALMIA OF CHILDREN.

SYMPTOMS.—Inflammation in the conjunctiva covering the lids, commencing generally on the third day after birth, and extending gradually over the entire surface of the eye, accompanied by intolerance of light, firm adhesion of the lids, swelling of the eyelids, and a copious discharge of purulent matter, which is pent up by the adhesion of the lids, and issues in large quantities on their separation. There is occasional eversion of the eyelids, during the cries or struggles of the child, or when an attempt is made to separate them, and the membrane is seen of a bright scarlet colour. The discharge is generally yellow, but sometimes greenish, or it is tinged with blood: occasionally it is ichorous. The disease may continue for eight or ten days, without involving the transparent parts of the eye; but about the twelfth day, if it be not properly treated, ulceration occurs at the circumference of the cornea, which first becomes hazy, then opaque, and

finally sloughy and infiltrated with pus. Sooner or later it gives way, and the iris protrudes. If the inflammation of the cornea stop short of ulceration it becomes opaque and usually adherent to the iris.

The usual constitutional symptoms are restlessness, sleeplessness, a furred tongue, and disordered bowels,—the results of the prolonged local irritation.

DIAGNOSIS.—There is no other disease of the eyes occurring at this early period with which it can be confounded.

PROGNOSIS.—*Favourable*, so long as the cornea retains its transparency. Inflammation and ulceration of the cornea, according to its degree, threatens injury to, or complete loss of, vision.

CAUSES.—The application of leucorrhœal or gonorrhœal discharges to the eye, during parturition; contagion. The common causes of inflammation?

TREATMENT.—Few diseases require more assiduous attention, and few so rapidly yield to treatment; neglect for a single day may result in permanent loss of vision. Six times a day the lids must be carefully separated and the surface of the conjunctivæ freely washed with warm water by means of a syringe, and one or two drops of solution of nitrate of silver (gr. ii. to gr. iv. to f ʒj.), or of alum (gr. viii. to gr. x. to f ʒj.) dropped into the eye just within the outer canthus. The lids should be subsequently smeared with a little olive oil. Lint wetted with water should be kept in contact with the inflamed lids. In chronic cases stronger stimulants may be used; and if the lids present a granular appearance, they may be touched with the solid nitrate of silver or sulphate of copper.

The bowels should be kept free by gentle aperients of castor-oil, magnesia, or manna.

PROPHYLAXIS.—The contagious nature of the disease requires that the greatest care should be taken to prevent the application of the matter to the eyes of other persons.

3. PURULENT OPHTHALMIA OF ADULTS.

SYNONYM.—Ægyptian ophthalmia.

SYMPTOMS.—The disease generally attacks both eyes, and sets in with a sensation of a foreign body beneath the eyelids, speedily followed by injection of the conjunctiva, and effusion of serum beneath it, with a discharge of a thick, puriform matter from the surface. The conjunctiva is of a bright-red colour throughout, the lids and anterior surface of the eye are swollen and granular, and the cornea is sunk, as it were, into a deep pit formed by the projection of the conjunctiva. The swelling is mixed here and there with extravasated blood. So long as the conjunctiva alone suffers, the pain is inconsiderable; but

when the deeper-seated textures are involved, the pain is extremely severe, and is felt in the globe of the eye, and around the orbit. In the globe itself it is a sensation of painful tension, and around the orbit it is similar to the pain of hemicrania. It is intermittent, or aggravated at intervals, and attains its greatest intensity at night. There is but little intolerance of light in any form of the disease. Rupture of the cornea sometimes takes place with permanent or temporary relief of the pain. The constitutional symptoms are not strongly marked; the pulse is somewhat increased in frequency, the tongue is coated, and the sleep disturbed by paroxysms of pain.

TERMINATIONS.—In resolution; chronic inflammation of the conjunctiva; granular conjunctiva; opacity, ulceration or sloughing of the cornea; staphyloma; prolapsis of the iris. The disease is very apt to recur.

CAUSES.—Contagion. The common causes of inflammation?

DIAGNOSIS.—From *catarrhal ophthalmia* by the greater severity of all the symptoms, and the greater tendency to implication of the deeper-seated parts; when the disease attacks those parts, by the intensity of the pain in and around the orbit. From diseases affecting the deeper-seated tissues alone, by the presence of severe inflammation of the conjunctiva.

PROGNOSIS.—*Unfavourable*, when very severe, or neglected in its commencement. From its tendency to attack the deeper-seated structures of the eye, loss of vision, or at least injury to the sight, may be anticipated. The prognosis should, therefore, be guarded.

TREATMENT.—Venæsection to fainting, followed, if the inflammation be unusually severe, by from twelve to twenty-four leeches round the orbit; free scarification, followed by strong astringents, of which the best is the nitrate of silver ointment (ten grains of nitrate of silver to $\mathfrak{z}$ i. of lard). The solid nitrate of silver, a solution of the same containing ten grains to the ounce, the undiluted liquor plumbi subacetatis, oil of turpentine, and other strong stimulants have been recommended. In chronic cases, the *vinum opii* may be used with advantage. Previous to the application the surface of the eye should be carefully cleansed by a syringe. Aperients should be administered at the outset; the patient should be put on a spare diet, and enjoined to take gentle exercise in the open air. When the deeper-seated textures of the eye are implicated, the remedies appropriate to the inflammations of those textures should be employed; such as the belladonna ointment in threatened adhesion of the iris; puncturing the cornea to prevent the rupture of the membrane; the application of the nitrate of silver to ulcers on the cornea, or to the protruding iris.

PROPHYLAXIS.—As the disease is highly contagious, great care should be taken to prevent the application of the matter to the eyes of healthy persons.

4. GONORRHOËAL OPHTHALMIA.

SYMPTOMS AND TREATMENT.—Those of purulent ophthalmia of adults; but the disease is more severe and runs a much more rapid course: a few hours may suffice for its complete development. In order to arrest it, we may pass solid nitrate of silver rapidly over the inflamed conjunctiva.

CAUSES.—Inoculation of the eye with gonorrhœal matter. Metastasis.

5. STRUMOUS OPHTHALMIA.

SYNONYMS.—Scrofulous, pustular, and phlycteuular ophthalmia.

SYMPTOMS.—This disease attacks children from the period of weaning, to eight or nine years of age, and sometimes up to the period of puberty. There is slight and partial redness of one, or of both eyes, sometimes confined to the eyelids, and caused by groups of enlarged vessels running from the circumference of the eye to the edge of the cornea, where they terminate in small pustules, which break and form minute ulcers. Sometimes the injection extends to the conjunctiva covering the cornea, and pustules are formed upon its surface. There is great intolerance of light, the eyebrows are contracted, and the nostrils and upper lip drawn upwards. Whenever the eye is exposed to light, there is a profuse flow of scalding tears, which, flowing over the skin, irritate and inflame it, and sometimes give rise to a pustular eruption, accompanied by white scabs—the *crusta lactea*. The symptoms remit towards evening. The constitutional symptoms are those present in other forms of scrofula, such as glandular enlargements, eruptions on the head and face, sore ears, general debility, tumid belly, disordered bowels, offensive breath.

CAUSES.—*Predisposing.* The scrofulous diathesis, and all the circumstances calculated to call it into action. *Exciting.*—The common causes of inflammation; catarrhal ophthalmia; the exanthemata.

DIAGNOSIS.—From catarrhal ophthalmia, by the more partial injection of the vessels, the greater intolerance of light; the formation of distinct pustules, and the presence of other symptoms of scrofula. From purulent ophthalmia, by its less severity and more chronic course, the absence of acute pain in and about the eye, and the age at which it occurs; the purulent ophthalmia of children occurring soon after birth, and up to the time of weaning, and the purulent ophthalmia of adults, after puberty, while strumous ophthalmia occurs in the interval between weaning and puberty.

PROGNOSIS.—*Favourable*, where the constitution is but slightly affected with scrofula; but *unfavourable*, when the strumous taint is strongly marked.

TERMINATIONS.—In resolution; in the formation of a “vascular speck,” or of *pannus*; in ulceration of the cornea, followed in some cases by protrusion of the iris, and its adhesion to the cornea; in infiltration of the cornea.

TREATMENT.—*Indications.* I. To improve the general health. II. To restore the vessels of the eye to their natural state.

I. By the treatment recommended for scrofula. See Scrofula (p. 385). Quinine is a most valuable tonic in this disease.

II. The second indication is fulfilled by warm fomentations to the eye; by vinum opii dropped two or three times a day into the eye; or by the use of any of the astringent collyria, with the red precipitate or citrine ointment, placed between the lids at bed-time; and by the counter-irritation of blisters behind the ears, an issue in the arm, or a ring or thread passed through the lobe of the ear. Ulcers on the cornea should be touched with nitrate of silver. The crusta lactea may be removed by a bread poultice, followed by a lotion containing a scruple of sulphate of zinc to an ounce of water.

SCLEROTITIS—INFLAMMATION OF THE SCLEROTIC.

SYNONYM.—Rheumatic ophthalmia.

This disease is sometimes uncombined with inflammation of other textures of the eye, but more frequently it coexists with inflammation of the conjunctiva (*catarrho-rheumatic ophthalmia*), or of the iris.

SYMPTOMS.—A deep-seated and dusky redness of the globe of the eye, especially around the cornea, where the radiating straight vessels of the sclerotic are seen abruptly terminating a short distance from its margin. There is an abundant flow of tears, extreme intolerance of light, and a sensation of fulness and tension, with darting pains in the globe, extending round the orbit, in the course of the branches of the fifth nerve, increasing towards evening, attaining its greatest intensity at midnight, and subsiding towards morning. There is generally some degree of haziness of the cornea, and vision is more or less impaired.

TERMINATION.—In recovery, or in chronic disease. If the disease extend to the cornea or iris, the results of inflammation of those parts.

CAUSES.—*Predisposing.* Middle age; the male sex; a previous attack; the rheumatic or gouty diathesis. *Exciting.*—The common causes of inflammation. The disease is simply local rheumatism.

DIAGNOSIS.—From inflammation of the conjunctiva by the deep-seated redness and radiated arrangement of the vessels; by the secretion of tears in the place of mucus; by the deep-seated pain of the orbit, extending to the surrounding parts; by the intolerance of light; in some cases, by its complication with iritis.

PROGNOSIS.—*Favourable*, if the disease be promptly treated. It is very liable to assume a chronic form, and to return.

TREATMENT.—An alterative purgative followed by a full dose of the sodæ et potassæ tartras combined with $\mathfrak{M}\text{xv}$. vini colchici. Quinine with the vegetable acids. Gr. x. pulvis ipecacuanhæ compositi at bed-time.

A solution of extract of opium to be occasionally dropped into the eye, which should be protected by a shade, or the patient should remain in a darkened room. Warm opium fomentation. The unguentum aconitiæ or U. belladonnæ should be rubbed into the forehead, and smeared over the eyelid and brow.

Chloroform and opium liniment may be used with the same view. If the inflammation be very acute, leeches to the temple or behind the ears.

In obstinate cases of chronic disease the arsenical solution, in doses of eight to twelve drops three times a day, is strongly recommended by Dr. Mackenzie.

The symptoms, terminations, and treatment of this disease are those of catarrhal inflammation of the conjunctiva, combined with that proper to rheumatic inflammation of the sclerotic. The treatment must be varied as the one or the other disease predominates.

CORNEITIS—INFLAMMATION OF THE CORNEA.

SYMPTOMS.—The disease begins with a slight haze on the cornea, which gradually increases till it amounts to opacity. Numerous minute ulcers now form on the surface, and the vessels of the conjunctiva and sclerotic become injected; those of the conjunctiva ramifying over the surface of the cornea, and those of the sclerotic being arranged in the characteristic radiated form around the margin of the cornea. Depositions of lymph between the layers of the cornea are also of frequent occurrence; and the secretion of the aqueous humour being augmented, increases the convexity of the membrane. During the progress of the disease, pus may form within the layers of the cornea, appearing as a yellowish-white spot. In such a case the posterior lamina may give way, when the pus is discharged into the anterior chamber and sinks down to the lower part, forming a yellow crescent (hypopyon); or the fibres of the anterior elastic lamina may be destroyed and a minute ulcer results. Such ulcers readily heal; but the cicatrix always remains opaque. There is generally considerable lachrymation and intolerance of light. The pain is usually slight, except occasionally in the first stage, when there is a sense of tension in the eye, with darting pains in the forehead.

DIAGNOSIS.—From other chronic affections of the eye, by a plexus of very fine vessels arranged in the form of a crescent at the edge of the cornea. Sometimes these vessels form an almost complete circle; from more severe diseases of the organ, by its chronic course.

PROGNOSIS.—Generally unfavourable, especially when the general health is much impaired.

TREATMENT.—That recommended under Sclerotitis.—Quinine is particularly useful in this, as in strumous ophthalmia. Should inflammation of the surrounding textures, and of the iris, take place, the treatment proper to iritis will become necessary. (See Iritis.)

IRITIS—INFLAMMATION OF THE IRIS.

SPECIES.—Idiopathic. Specific.

IDIOPATHIC IRITIS.

SYMPTOMS.—The disease begins by the formation of a red zone of small, straight, parallel vessels, arranged as radii round the circumference of the cornea, and terminating abruptly near its edge, the redness after a time extending to the conjunctiva. The iris loses its brilliancy, becomes muddy, and of a tint formed by blending a red with its original hue; its texture is at the same time impaired or destroyed, and lymph is largely effused into its substance, thrown out from its edge, or deposited from its anterior or posterior surface, or in all these situations. Sometimes the quantity of lymph effused is so large as to fill the chambers of the eye. The movements of the iris are at first impeded, and then altogether suspended; the pupil contracts, and becomes irregular in shape, from effusion into its substance and adhesion to surrounding parts. There is dimness, and at length complete loss, of vision. There is generally severe pain in the globe and round the orbit, darting to the cheek and temple, and aggravated at night. In severe cases the local symptoms are accompanied by acute fever.

DIAGNOSIS.—The diagnostic marks of this disease are, the change of colour, the irregular shape of the pupil, and the effusion of lymph behind the cornea. The radiated arrangement of the vessels is common to iritis and sclerotitis.

PROGNOSIS.—*Unfavourable*, in severe cases, and when the treatment has been delayed. *Favourable*, in mild cases, and in acute cases when promptly treated. A contracted pupil, great vascularity, acute and deep-seated pain, and greatly-diminished sensibility or total insensibility to light, are very unfavourable symptoms.

CAUSES.—Mechanical injuries, surgical operations, over-exertion of the eyes, and the common causes of inflammation.

TREATMENT.—*Indications.* I. To subdue inflammation. II. To prevent the effusion and promote the absorption of lymph. III. To dilate the pupil and prevent the formation of adhesions.

I. Leeches to the temple, brisk aperients, a strict antiphlogistic regimen, the exclusion of light, and perfect rest.

II. To fulfil the second indication, calomel and opium must be given from the outset, in doses of gr. $\frac{1}{2}$ to gr. i., with from a quarter to half a grain of opium, every three, four, or six hours, according to the

severity of the symptoms. In very severe cases it may be well to resort to mercurial inunction. The calomel and opium may be advantageously combined with tartar-emetic in the dose of from one-sixth to one-quarter of a grain.

III. The third indication is fulfilled by occasionally dropping a little liquor atropiæ into the eye.

SPECIFIC IRITIS.

VARIETIES.—Syphilitic; Rheumatic; Arthritic; Strumous.

SYPHILITIC IRITIS.—The *symptoms* resemble those of idiopathic iritis, but they generally come on slowly and insidiously. When fully established, the disease may prove highly destructive to the eye. The *cause* is, as the name implies, the syphilitic virus. The disease sometimes occurs alone; at others, in combination with other secondary symptoms; and it may make its appearance during the existence of the primary disorder. The *diagnosis* turns on the position in which the lymph is effused, and on its appearance. It is thrown out on the margin of the iris in the form of globules or distinct masses, of a reddish, brownish, or brownish-yellow colour, sometimes described as tubercles. At the same time the pupil is displaced upwards and inwards, the sclerotic zone is of a cinnamon colour, and small brown spots form on the cornea. The *treatment* consists in inducing the constitutional effects of mercury, as speedily as possible, by the exhibition of calomel and opium, and the infriktion of mercurial ointment into the arm-pits or groins. Atropia must be used to dilate the pupil.

RHEUMATIC IRITIS.—The *symptoms* are usually associated with those of scleritis (see page 665). The sclerotic, however, has a peculiar purplish hue, and the radiating vessels stop within one or two lines of the margin of the cornea, leaving a bluish-white ring around it,—appearances which are characteristic of this affection. Blood-vessels become visible in the iris. The inflammation is rarely accompanied by the deposition of fibrin, and when this does occur, its quantity is small, and it is effused around the papillary margin.

CAUSE.—Exposure of the eye to a draft of cold air.

TREATMENT.—That of scleritis (see page 666), care being taken to prevent adhesion of the iris to the capsule of the lens by the occasional instillation of liquor atropiæ. Mercury is of little or no use in this variety of the disease.

ARTHRITIC IRITIS.—This disease occurs in persons subject to gout, or of gouty constitution, when weakened by abstinence, or any occasional cause of debility. The *symptoms* resemble those of rheumatic iritis. The disease is very apt to recur. The general *treatment* of the acute disease is that of rheumatic iritis; the use of mercury is equally inefficacious in this form; preparations of colchicum should therefore be substituted for those of mercury, local depletion having been previously practised, according to the severity of the disease and the state of the patient's constitution. Sulphate of quinine, Fowler's solution,

and the sesquioxide of iron, have also been recommended. The diet should be carefully regulated, and absence from stimulating articles of food and drink must be enjoined.

STRUMOUS IRITIS.—This form is generally the result of an extension of strumous ophthalmia to the deeper-seated structures, and is chronic and obstinate. The constitutional treatment is that of other forms of scrofula: the local treatment being determined by the degree and extent of the existing inflammation. Solution of atropia must be used as in the other forms of iritis.

USE OF THE OPHTHALMOSCOPE.

In order to ascertain the condition of the deeper structures of the eye, the use of the ophthalmoscope is indispensable, and a few words on its management will not be out of place here.

If we wish to explore the whole fundus of the eye, the pupil must be well dilated previously by the instillation of a few drops of a solution of atropine between the lids.

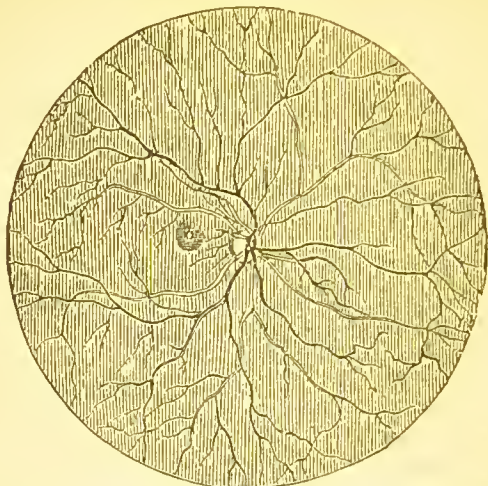
But since the pupil does not regain its contractility for some time, we must use the solution as seldom as possible, and we may generally dispense with its use when a glance at the optic nerve and the parts immediately surrounding it is alone wanted. Let the patient be seated in a dark room, and place an argand gas-light, or moderator lamp just behind his shoulder and close to the side of his head, so that the light is on a level with the eye and so far behind it that the face is in shade. Stand or sit opposite the patient, apply the ophthalmoscope to your own eye, at a distance of eighteen inches from the eye of the patient, and looking attentively through the sighthole, so direct the rays reflected from its mirrored surface that they fall upon the patient's eye. Next interpose the lens at the distance of about an inch in front of the patient's eye, and then by a slight backward and forward movement of your own head and the speculum together, catch the proper focal distance, and the image of the fundus of the eye will appear as a reddish glow. On attentive consideration, the following parts may be distinctly made out:—

NORMAL APPEARANCE OF THE FUNDUS OF THE EYE.—Figs. 75 and 76.—The *entrance of the optic nerve* (optic disc, optic papilla) is seen as a white or rosy-tinted circular spot limited by a sharp, well-defined, circular line, formed internally of the margin of the choroid, externally of the margin of the sclerotic. The margin of the optic disc is slightly raised above the general concavity of the fundus, while its central parts are slightly depressed below it. A little internal to the optic entrance the *yellow spot* may be seen: it is the darkest part of the fundus, forming a dusky oval or roundish patch, as large as, or smaller than the optic entrance. In the centre may be distinguished a small bright dot, the *fovea centralis*. The optic entrance and yellow spot are surrounded by an orange-red field, varying in intensity of colour

670 NORMAL APPEARANCE OF THE FUNDUS OF THE EYE.

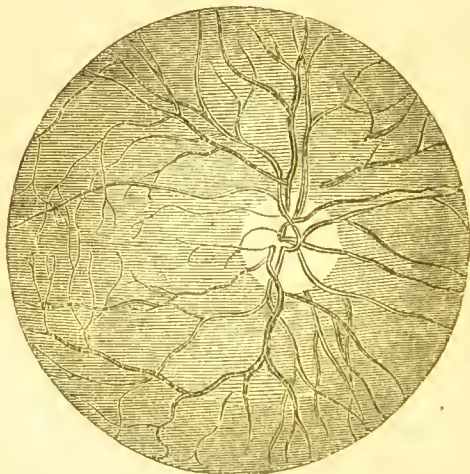
according to the complexion, and pervaded by the retinal vessels. The

Fig. 75.*



retinal artery and vein in obtaining entrance into the eye, perforate the

Fig. 76.†



optic entrance, where each consists of from one to three trunks; the

* Fig. 75 represents the retina spread open; the parts are of natural size; the yellow spot, and a little below and to the inner side, the optic nerve entrance and the retinal vessels, are seen.

† Fig. 76 represents the healthy fundus as magnified by the ordinary lens: the optic nerve entrance, and the distribution of the retinal artery and nerve are shown.

artery is distinguished from the vein by its smaller size, its scarlet colour, and its dichotomous ramifications. The veins are more tortuous, and receive branches at considerable angles. Leaving the optic entrance, these vessels are seen to ramify freely over the surface of the retina, diverging above and below the yellow spot so as to avoid it, and spreading their fine terminal branches towards the anterior edge of the retina.

The different parts of the fundus are successively brought into view as the patient moves his eye outwards or inwards, downwards or upwards. The yellow spot, being in the axis of the eye, will be seen when it is directed straight forward; the optic entrance, which is $\frac{1}{10}$ of an inch internal to and a little below the yellow spot, will be visible when the eye is rolled a little inwards. During the examination of a particular part of the fundus, the patient should be directed to fix his eye on a given number, marked in large characters on a screen behind the investigator.

In dark-complexioned individuals the *choroid vessels* cannot be distinguished; but in those who have light hair and blue eyes, they may be readily seen, and the beautiful arrangement of the *vasa vorticosa* observed.

In Albinos it is possible to see, through the choroid, the ciliary arteries in the *sclerotic*.

DISEASES OF THE CHOROID.

This membrane being essentially composed of a fine network of delicate blood-vessels, is exceedingly liable, not only to participate in several constitutional diseases, but also to implicate in its own disorders those important parts of the eye which are dependent upon it for nutrition or are otherwise intimately associated with it. Lying between the sclerotic and retina, and forming anteriorly the choroid body and the iris, every change of the choroid must, in a lesser or greater degree, affect these continuous and contiguous parts also. Nevertheless, the choroid may be the prime seat of changes which only secondarily involve the other structures.

CONGESTION OF THE CHOROID.—*Morbid Appearances.* Increased redness of the fundus, and enlargement, with more or less tortuosity of the blood-vessels. As the colour of the fundus varies in intensity in different people, we can only diagnose the condition satisfactorily by a comparative examination of both eyes.

Symptoms.—Pain, or aching fulness, intolerance of light, lachrymation.

INFLAMMATION.—*Morbid Appearances.* Those of congestion in exalted degree, with the presence of effusion, which may be poured out between the choroid and sclerotic, or between the choroid and retina, or they may burst through the latter and escape into the vitreous humour. The choroid itself may be swollen and opaque from interstitial effusion. In the disseminated and syphilitic varieties white patches or rounded

spots of effusion, and black spots, composed of masses of pigment epithelium, are seen on the surface of the choroid. Capillary hæmorrhage is not common; when it does occur the extravasation is more extensive and less defined than when occurring in the retina. The effused serum in front of the choroid may be deeply stained with blood. If the inflammation be uncontrolled it soon affects the vitreous humour, which becomes hazy. If the effused products have been limited to the substance of the choroid, they may be absorbed, and recovery effected. If the inflammation take on the suppurative form, it may rapidly spread and disorganize the whole contents of the eye. Recovery is generally incomplete, for as the exsudation is removed the choroid undergoes *atrophy*, the pigment cells are destroyed at the points where the inflammation developed itself, and corresponding parts of the surface of the white sclerotic are exposed. The fundus therefore presents yellowish-white patches with ragged margins, bounded by, and dappled over with, the black unaltered choroidal epithelium. If the inflammation have been more diffuse, only small black islands of unaltered pigment are left scattered over the pale fundus. The retinal vessels are seen undisturbed in front of this mottled field. (Fig. 77.)

Fig. 77.



Symptoms.—The general symptoms are those of congestion of the choroid in increased intensity.

The external symptoms are usually but little marked. In some cases there is no external indication of the disease. When the ciliary processes are implicated, there is vascularity of the corresponding part of the sclerotic, and fulness of the veins. The pupil is usually inactive.

Terminations.—Staphylomatous protrusions of the sclerotic, forming blue tumours aside of the margin of the cornea. Glaucoma is no doubt a frequent result of choroiditis.

Treatment.—In congestion of the choroid the patient should avoid bright light, he should read little, and use large type. The cold douche should be frequently applied to the eyes, and occasionally to the whole head. If debility be present, quinine with mineral acids or the astringent chalybeates, may be ordered. If inflammation be present, leeches or blisters to the temples; calomel and opium given to slightly affect the gums; and the patient must be kept in a darkened room.

DISEASES OF THE RETINA.

ANÆMIA may result from a general anæmic condition or from the obstruction of the retinal artery by an embolus. When it results from the first cause there is simply pallor of the optic disc, rendering the veins very conspicuous. The *symptoms* are fatigue and dimness of vision. When it arises from blockade of the retinal artery, its branches are seen to be empty and contracted and the veins collapsed. Under such conditions there is blindness, and its accession is sudden.

ATROPHY OF THE OPTIC DISC AND RETINA.—Optic disc atrophied, sunken, pearly white, and very conspicuous; retinal vessels contracted. Retina in neighbourhood of optic disc and yellow spot opaque and white. This condition is indicative of atrophy of the intracranial portion of the optic nerve constituting the so-called “cranial amaurosis.”

Symptoms.—Obscurity of vision coming on gradually or suddenly, followed by insensibility of the greater portion of the retina. The fingers may be dimly seen in only a certain limited position.

IMBIBITION AND SWELLING OF THE OPTIC NERVE, WITH FATTY DEGENERATION OF THE RETINA.—*Morbid Appearances.* Spots of an intense white colour streaking the optic disc, indicating commencing induration of the nerve fibres; little white points grouped in the form of a star near the yellow spot, representing fatty degeneration of the anterior extremities of the radial fibres of the retina. Numerous minute linear extravasations of blood lie between the altered fibres, and give a more decided appearance of radiation to the diseased patch of retina. In a more advanced stage of the disease, the swelling of the optic disc almost disappears, and the fundus is occupied by a more or less extensive patch of pearly whiteness, maculated and striated here and there, by minute extravasations, and limited by an irregular dotted margin. The degenerate arteries and tortuous veins appear with great distinctness as they radiate over this mottled-white field.

Symptoms.—Dimness of vision gradually increasing to complete blindness, without pain or external symptoms.

Cause.—"This condition of the retina is so characteristic of Bright's disease that it allows one, by ophthalmoscopic examination alone, to recognise with certainty the affection of the kidney." (Liebreich. Atlas der Ophthalmoscopie, p. 25.)

RETINITIS.—*Morbid Appearances.* Redness of optic disc, becoming intense, obscurity of its outline, gradually increasing until it is lost to view, retinal veins enlarged and varicose; sometimes the fundus is dotted over with red spots of blood; thickening of the retina by serous infiltration and diminution of its transparency, so that a view of the deeper portions of the veins is prevented, and they have the appearance of being interrupted. In proportion to the quantity and density of the opaque inflammatory products, the red colour of the choroid becomes dimmed, and at last obscured, so that the retina is alone seen. It is of a dull drab or grey colour, and may present here and there patches of ecchymosis.

In the *syphilitic variety* the affected portion of the retina is rendered opaque by solid effusion forming a white patch stretching from the obscure margin of the optic disc, around the yellow spot, and thence spreading as a streak towards the circumference. It is distinguished from the degeneration occurring in Bright's disease, by the absence of the sharp definition and vivid whiteness which characterize that affection.

Symptoms.—Dim and distorted vision, lines appear zigzagged, and vertical objects out of the perpendicular; occasionally fiery flashes are noticed; there is often considerable pain in the head.

Causes.—Strong light; the heat and light of large fires; light reflected from snow or sand; lightning; overstraining the eye in examining very minute objects.

Treatment.—That of local inflammation. Quinine should be given early; for the syphilitic variety preparations of mercury or of iodine are needed. (See Secondary Syphilis.)

RETINAL HÆMORRHAGE (Retinal apoplexy).—*Morbid Appearances.* Extravasation of blood in spots, streaks, or patches. The effusion may take place in the fibrous or cellular layers of the retina, or upon its surface between it and the lining membrane, or it may rupture the latter, and extravasate into the vitreous humour.

When recent, the colour of the effusion is crimson; afterwards it becomes black or brown.

Symptoms.—More or less imperfection of vision coming on suddenly after exertion in a stooping posture, or after a blow on the globe of the eye: only the half of an object may be seen. There are usually dilatation, sluggish action, or immobility of the pupil. Small objects cannot be distinguished, light, and all large objects often appear of a deep red colour. Except in case of violence, there is no pain or intolerance of light.

Causes.—Violent straining, congestion of the retina from impeded circulation; suppression of the menses; degeneration of the coats of the retinal vessels; blows of the eyeball; convulsions; apoplexy; Bright's disease.

Prognosis.—Dependent upon the cause. *Favourable* if the patient be young, and the effusion small. *Unfavourable* in injury from violence, in proportion to the amount of direct violence, to the imperfection of vision, to the inactivity of the iris, and to the presence of intra-ocular or intercranial pain.

Treatment.—Leeches to the temples, a brisk hydragogue purgative, and the constant application of cold to the eye. If pain be present, opium may be given. If light be intolerable, the patient must be kept in a dark room, and in every case direct light must be avoided. The sound eye must not be used in reading or fine work.

Under the most favourable circumstances, the effusion is slowly absorbed, and the function of the retina restored; and during the repair of the injury, the excitement of light, and work must be carefully avoided.

DISEASES OF THE CHOROID AND RETINA.

CHOROIDO-RETINITIS PIGMENTOSA.—*Morbid Appearances.*—Those of atrophy. The choroid and retina are atrophied, speckled with pigment, and unnaturally adherent. The disease is characterised by commencing in a more or less complete circle at the ora serrata (ant. margin of retina), and spreading backwards towards the optic disc, which ultimately becomes implicated in the atrophy.

Symptoms.—A general contraction of the field of vision, while the central parts remain naturally clear; in two words—circumferential blindness. When the disease has made considerable centripetal advance, night blindness occurs. The progress of the disease is often very slow, and there are no external evidences of its presence. As the fundus of the eye becomes affected, blindness creeps on, and the pupil becomes large and inactive. Total blindness at last results.

Causes.—Chronic inflammation and defective nutrition.

DETACHMENT OF THE RETINA FROM THE CHOROID—(FLOATING RETINA).—*Morbid Appearances.* If the displacement be extensive, it is readily observed; if but slight it is ascertained with difficulty. It is first observed at the lowest part of the fundus, caused probably by the gravitation of the effused fluid. If this be serum, the detached retina projects into the vitreous humour as a tense vesicle, or folded membrane which vibrates or undulates with every movement of the eyeball. The limit of detachment is marked by the sudden bending of the vessels and by a diminution in the colour of that portion of the fundus which is detached. In the earlier stages of the disease the colour of the choroid is transmitted through the retina, which still retains its natural transparency. In long-standing cases the detached

retina becomes pearly white and opaque, and the colour of the choroid is no longer apparent. The separation of the retina may be partial, or it may gradually increase until it is wholly disunited from the choroid. It is then pushed forwards in the form of an irregular hollow cone, the apex of which is formed by the optic disc. In extreme cases it is reduced to a mere cord traversing the posterior part of the axis of the globe, and resembling a persistent hyaloid canal.

Symptoms.—The disease comes on so insidiously, that the blindness caused by a complete detachment of the retina may be discovered by closure of the sound eye, quite accidentally. There is no pain, and the appearance of the eye is quite natural. If the condition be manifest, then obliteration of the field of vision, corresponding to the limited detachment of the retina, is observed. If the *lower* half of the nervous layer be detached, then the field of vision is terminated by an irregular horizontal line, *above* which is darkness.

Diagnosis.—Cancerous tumours of the choroid may coexist, and be overlooked, in this condition of the retina. Effusions into and opacities of the vitreous membrane may be mistaken for it; the absence of these latter conditions is determined by the presence of the retinal vessels in the projection.

Cause.—Inflammation of the retina or choroid may result in this condition.

Treatment.—If the retina be wholly detached, the sight will not be regained, even if we cause the absorption of the fluid which has caused the detachment. In cases of partial separation, the absorption will be promoted by the repeated application of blisters to the temple, and a prolonged course of iodide of iron.

DISEASES OF THE SCLEROTIC AND CHOROID.

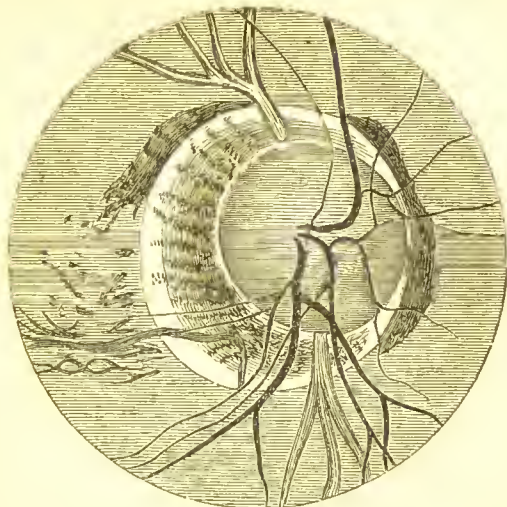
STAPHYLOMA POSTICUM (SCLERECTASIA. POSTERIOR SCLEROTICO-CHOROIDITIS POSTERIOR).

Definition.—A conical protrusion backwards, of a portion of the sclerotic, in the neighbourhood of the optic nerve, usually on its outer side, involving the choroid and retina.

Morbid Appearances.—A clear zone immediately surrounding the optic nerve (Fig. 78), caused by removal of pigment from the atrophied choroid, which no longer prevents a view of the white sclerotic behind it. The zone is whiter in proportion as the disease is more advanced, and greyish streaks or spots are observed in it. At first the zone is incomplete, and assumes the form of a crescent joined by its concave edge to the optic nerve. As the atrophy of the choroid proceeds further outwards, the white or mottled zone spreads in a more or less circular form. (Fig. 79.)

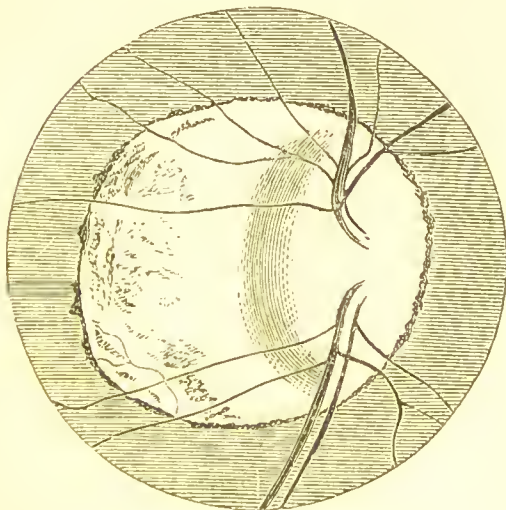
In more advanced stages the circular outline is lost, the atrophied choroid extending into rounded or oblong processes. (Fig. 80.)

Fig. 78.



The white crescentic figure so characteristic of this disease is the

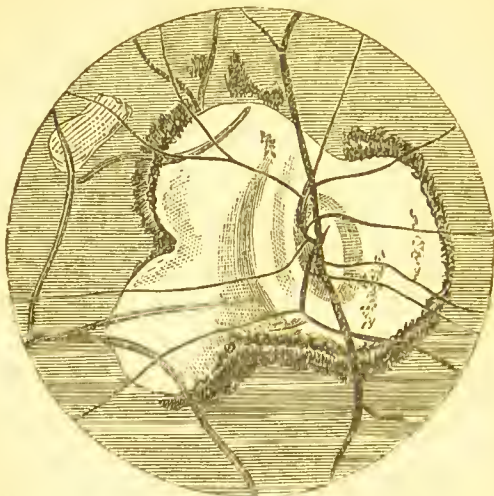
Fig. 79.



inner surface of the protruded sclerotic. When the staphyloma is deep, the adjacent portion of the sclero-choroidal ring bounding the optic nerve is obliterated, and the corresponding side of the optic nerve entrance is pulled down into the hollow. When this has happened the nerve entrance is seen in perspective, and its figure is consequently

elliptical in proportion as it slopes into the hollow. When the staphyloma is to side of the optic nerve, the major axis of the ellipse will of course be vertical. This condition is well represented in Fig. 80.

Fig. 80.



Symptom.—Posterior staphyloma is the most frequent cause of myopia (short sight). When the yellow spot becomes involved in the disease amblyopia results.

Diagnosis.—The white crescentic figure near the optic nerve; unusual distinctness of the retinal vessels ramifying in front of a white ground; and their undulatory course from the nerve entrance across the depression, are positive marks of posterior staphyloma.

Cause.—According to Von Ammon there exists in an early stage of foetal life a protuberance of the sclerotic on the outer side of the optic nerve, and this protuberance communicates with the anterior cerebral vesicle by means of an oval opening. There is therefore a natural predisposition to this defect, and a very slight accident or arrest of development may determine its existence. Atrophy of the choroid, resulting in imperfect nutrition, wasting, and distension of the sclerotic, may produce it in after life.

Treatment.—The defect of vision may be remedied by the use of concave glasses, of suitable power.

DISEASES OF THE LENS.

Every morbid process which affects the lens results in more or less irremediable opacity of the part; and under the term "cataract," every degree of opacity is included. Cataract is conveniently subdivided into *lenticular* and *capsular*, according as it affects the lens and its capsule respectively.

CONGENITAL CATARACT.—Four varieties. I. A minute chalky-white dot, deposited in the most superficial part of the lens within the capsule, and occupying the centre of a clear dark pupil (Cat. centralis). II. A more extensive deposit occupying nearly the whole area of the pupil; it has a conical shape, with the apex directed forwards (C. pyramidata). III. A greyish-white opacity composed of faint striæ, terminating in a little opaque white dot. IV. Irregular fatty or earthy patches, affecting either the anterior or posterior surface of the capsule.

These opacities are circumscribed, the rest of the lens remaining perfectly clear: they do not extend, and when small do not prevent sight. When large they require surgical interference. They are diagnosed from diseases of deeper structures by their brilliant white colour and comparatively superficial position. Morbid deposits in the fundus of the eye have a yellow colour. Congenital C., as a rule, affects both eyes. The symptoms attendant upon these conditions are, more or less cloudiness of vision and inability to distinguish type; but when the pupil is dilated with atropia, the most perfect and minute vision.

C. IN ADULTS AND OLD PERSONS.—Complete opacity of lens, except from injury, is rare before forty. After fifty it is the commonest cause of failing sight. The *hard* variety of the disease spreads inwards from circumference to centre. Opaque streaks first appear at the extreme edge of the lens, which gradually coalesce into patches and spread in a radiating manner, first and chiefly over the posterior surface, and at a later period involving the anterior surface. After a year or more the whole lens becomes a little hazy, and opaque streaks begin to appear within the margin of the pupil, and converge to the central line of vision, and slowly the pupil changes from black to milk-white, and the opacity of the lens is complete. In rare instances the opaque lens becomes deep-brown.

In the *fluid* form of C., however, no converging streaks will be seen; the morbid process is one of softening, which goes on until the whole lens is converted into a white, bluish-white, or dirty grey pul-
taceous matter.

GLAUCOMA.

VARIETIES—Acute and chronic.

DEFINITION.—Inflammation of the internal structures of the eye leading to effusion of fluid within the eyeball, and causing destructive distension.

SYMPTOMS come on between the ages of fifty and sixty. Both eyes are usually affected. In the *acute* form of the disease begins with sudden and violent pain in the eyeball and temple, followed by rapid extinction of vision; the pupil is widely dilated, motionless, and sometimes transversely oval, and of a greenish tint; the iris is bulged forward, and its veins are often distinctly enlarged; the lens is hazy or even milky, and advanced almost to the posterior surface of the cornea;

cornea dull; the sclerotic and conjunctiva behind the margin of the cornea are congested. The globe feels very hard, and is tender.

The *chronic* form begins very insidiously: dimness of sight; dull aching pain in the eye or head, and flashes of light across the field of vision, sooner or later indicate the progress of internal disease. The patient becomes gradually blind, the pupil enlarged and insensible, and the eye ultimately assumes the appearances above described, but the distended globe is not painful on pressure. Chronic iritis and cataract appear sooner or later, and large dark purple veins show themselves on the surface of the sclerotic. In the early stage of glaucoma, examination of the fundus of the eye will usually reveal depression of the optic nerve entrance.

When the eyeball is distended by effusion, the termination of the optic nerve being unsupported by the sclerotic, is the first part to yield to the pressure, and as it is pushed backwards a corresponding depression of the optic disc is effected. This condition is distinctly characterised by the appearance of the blood-vessels in the optic disc and at its margins. At the bottom of the depression the main trunks are spread out, and appear smaller and quite unconnected with their larger prolongations at the margin of the excavation. By focussing the vessels at the bottom of the depression, and then gradually advancing the lens, so as to advance the focus, we may trace the continuity of the central and peripheral trunks, and, at the same time, measure approximately the depth of the depression. Extravasations of blood in the retina are of very common occurrence.

CAUSE.—Inflammation of the contents of the eyeball, probably commencing in the choroid.

PROGNOSIS.—Extremely unfavourable.

TREATMENT.—Mercurial salivation does not appear to arrest the progress of the disease. In the *acute* form leeches, and subsequently blisters, to the temples; cold affusions to the head; opium, and quinine in full doses; an occasional brisk purgative.

The chronic disease has been much alleviated, and sight partially restored by extraction of the lens and excision of a portion of the iris.

SPECIFIC DISEASES OF THE EYE.

The internal tunics of the eye are often the seat of cancerous and tubercular deposits, and the lens, vitreous humour, and anterior and posterior chambers are sometimes occupied by parasites (*Cysticercus tenuicollis*, *Filaria oculi*, and *Distomum ophthalmobium*). It is important to be able to recognise a *melanotic growth* in the earliest stages of its existence, in order that the eyeball may be extirpated, and the disease thus removed before it has involved other structures behind the globe. Dull pain, increasing dimness of vision, or dilated and sluggish pupil, a bright metallic reflection from the fundus, and the appearance of a vascular tumour, projecting into the vitreous humour, are the symptoms of the disease.

The diagnosis of cancer mainly rests on the presence of blood-vessels

different in their arrangement, or distinct from those of the retina. But medullary and melanotic cancer often have their seat in the choroid, and then the retina is pushed forwards and the ophthalmoscopic indications are not diagnostic.

Tubercular deposit forms a bright yellowish *non-vascular* tumour.

Entozoa may be distinguished by their form and movements.

AMAUROSIS.

Synonym.—Gutta serena.

Although this indefinite term is well-nigh obsolete, we may conveniently use it here for the purpose of enumerating all causes of blindness, except those which are discoverable by the unaided eye, such as opacities of the cornea and lens.

Amaurosis may be subdivided into two kinds: 1. Temporary or functional. 2. Permanent or organic.

Temporary amaurosis is due to the following causes:—exposure to intense light, loss of blood, diphtheria.

Permanent amaurosis may be due either to interocular or to intercranial disease. In the former case it is attendant upon the following organic changes: fatty degeneration of the retina, as occurs in Bright's disease; retinitis; retinal hæmorrhage; choroiditis with effusion of serum or blood, causing detachment of the retina; scrofulous or melanotic tumours, immediately behind or in front of the retina; glaucoma.

Intercranial amaurosis may be caused by pressure upon or atrophy of any portion of the optic nerves, or those parts of the Optic thalami and Corpora geniculata in which they have their origin.

The ophthalmoscope will generally enable us to discover the exact cause of the blindness. If the disease be intercranial, the optic nerve entrance will present characteristic indications. (See Atrophy of Optic Disc, p. 673.) Having ascertained the cause, the treatment must be adapted according to it.

DEFECTS AND DISPROPORTION OF THE REFRACTIVE MEDIA OF THE EYE.

Such defects as the following are very common; and since some are remediable, while others occasionally give rise to alarm, it is necessary that the practitioner should be familiar with them.

ASTIGMATISM.—Under this title Dr. Donders* includes those phenomena which result from inequality of the refractive media. The error chiefly lies in the cornea itself, which, on account of variation in thickness or density, produces the same effect upon vision as an unsmooth pane of crown glass when interposed between the eye and a distant object. The rays of light being unequally refracted as they pass through the several parts of the pane or unequal cornea, straight

* Accommodation and Refraction of the Eye. New Syd. Soc., 1864.

lines do not preserve their parallelity, but become zig-zagged and broken, and circles lose the equality of their radii;—in a word, a straight line appears broken, and a circular spot unsymmetrical, and the sharpness of vision is thus interfered with.

Dr. Donders recognises two varieties of astigmatism, *irregular* and *regular*.

Irregular astigmatism he defines to be “an aberration, which has reference to the rays refracted in one and the same meridian.” Owing to such a condition, a Roman letter, for example, appears confused. Regular astigmatism is due to “an aberration dependent on the difference in focal length of the different meridians of the light refracting system.” This condition results in an apparent extension in one or other direction of the figures of objects; thus a sphere is perceived as an oblate or prolate spheroid, and a square is extended into an oblong.

MYOPIA.—Short sight; an inability to distinguish near objects when placed at the usual distance from the eye. It is caused by a disproportionately great convexity of the refracting media, whereby the image of an object held at the usual distance from the eye is brought to a focus at a point in front of the retina; and in order to throw the image further backwards upon the retina, the individual must approximate the object to the eye.

Any circumstance which causes a prolongation of the visual axis must result in myopia. According to Liebreich, Donders, and others, posterior staphyloma (see p. 676) is the most frequent cause of this defect.

Myopia is remedied by the use of biconcave glasses of such a focus as that distant objects shall appear distinct and undiminished in size.

PRESBYOPIA.—Old or long sight. Inability to discern near objects. This is caused by disproportionately small convexity of the refracting media, whereby the image of an object held at the usual distance from the eye is brought to a focus at a point behind the retina, and in order to advance it upon the retina, it is necessary to withdraw the object to an unusual distance from the eye.

This defect is compensated by the use of biconvex glasses of suitable convexity.

MUSCÆ VOLITANTES.—Some persons are annoyed, and for a time alarmed, by minute dark specks or beaded filaments, which, by floating in front of the retinal image, puzzle and constantly threaten to obscure vision. “If the eye be directed towards a clear sky, and then kept steadily fixed, the spots appear to sink slowly downwards. A brisk movement of the eye instantly whisks the little bodies about in various directions, and then as soon as the eye is steadied, they again slowly sail across the field of vision.” (Dixon on Diseases of the Eye). M^r Kenzie supposes them to be shadows cast upon the retina by minute bodies moving in front of, and almost in contact with it. They are irremovable, are not symptomatic of any further defect or disease, and are “quite compatible with excellent and lasting sight.” (Dixon, *op cit.*)

DISEASES OF THE EAR.

1. OTITIS EXTERNA . . . Inflammation of the External Ear.
2. OTITIS INTERNA . . . Inflammation of the Internal Ear.
3. SURDITAS . . . Deafness.

OTITIS EXTERNA—INFLAMMATION OF THE EXTERNAL EAR.

VARIETIES.—1. Acute; 2. Chronic.

1. ACUTE INFLAMMATION OF THE EXTERNAL EAR.

SYMPTOMS.—Pain in the auditory canal, gradually increasing in severity, and augmented by cold, pressure, and the motions of the jaw; deafness; noises in the ear; redness and swelling of the lining membrane; and after an interval of a few hours, or of one or two days, a thin acrid fœtid discharge, often tinged with blood, and at length becoming puriform. The inflammation is followed by enlargement of the mucous follicles, and terminates by suppuration, ulceration, and the formation of scabs, or of painful granulations.

TERMINATIONS.—In resolution, or in the chronic form, accompanied by chronic deafness.

CAUSES.—*Predisposing.* Childhood; the scrofulous diathesis.

Exciting.—Cold; the introduction of foreign bodies into the ear; chemical irritants; the stings of insects; the sudden suppression of eruptions of the scalp or face; the extension of inflammation from surrounding parts; the exanthemata, especially scarlatina.

TREATMENT.—Poultices and warm fomentations to the ear; the injection of warm water, either pure or containing from five to ten grains of acetate of lead to the ounce; in severe cases, leeches behind the ear, blisters or tartar-emetic ointment over the mastoid process; aperients, tartar-emetic in nauseating doses; a spare diet and antiphlogistic remedies. If an abscess should form, poultices and warm fomentations, to promote suppuration and encourage the discharge.

2. CHRONIC INFLAMMATION OF THE EXTERNAL EAR.

SYMPTOMS.—The same as in acute otitis; but less severe, and of long continuance.

TREATMENT.—If the disease be still recent, and the acute stage have only partially subsided, injections of warm water, or of a weak solution of acetate of lead, should be used several times in the day, for several days together, followed by weak astringents, such as solutions of alum, sulphate of zinc, and nitrate of silver, gradually and cautiously increasing their strength. If granulations of the mucous membrane have formed, tents of lint or cotton, dipped in a solution of acetate of

lead or sulphate of zinc, may be introduced into the meatus. The general treatment will consist in the steady use of aperients and alteratives, nourishing diet, pure air, and cleanliness; and if there be much debility, tonics, of which steel is the best. If the discharge should suddenly cease, and symptoms of head affection occur, hot poultices and fomentations should be applied to the external ear, at the same time that the head affection is met by appropriate remedies.

OTITIS INTERNA—INFLAMMATION OF THE INTERNAL EAR.

VARIETIES.—1. Acute; 2. Chronic.

1. ACUTE INFLAMMATION OF THE INTERNAL EAR.

SYMPTOMS.—Acute, deep-seated pain in the ear, and in the head and face of the same side, which is increased by mastication; a sense of tension in the ear; loud noises; deafness; sometimes swelling of the tonsils, with dull pain or itching at the back of the throat. There is a frequent, quick, and hard pulse, hot skin, anxious countenance, furred tongue, anorexia, general febrile excitement, restlessness, sleeplessness, and, in very severe cases, delirium and convulsions.

TERMINATIONS.—In resolution, with gradual subsidence of the symptoms. In suppuration, accompanied by throbbing pain and extreme tension, followed by a discharge of matter by the external meatus, the membrana tympani having been ruptured, or through the Eustachian tube into the throat, or through an opening in the mastoid process.

CAUSES.—Those of inflammation of the external ear; the extension of inflammation from the throat through the Eustachian tube.

DIAGNOSIS.—From inflammation of the external ear by the deeper-seated pain, the absence of discharge from the external meatus in the early stage of the disease, and the results of an examination of the external ear. The rupture of the membrana tympani may be recognised by the speculum; and if the patient expire forcibly, the mouth and nostrils being closed, air will issue from the ear.

PROGNOSIS.—Deafness is a very common consequence of this disease; and inflammation of the dura mater, and other membranes of the brain, an occasional result.

TREATMENT.—Bleeding, followed by cupping or leeches behind the ear, and counter-irritation, by blisters or tartar-emetic ointment, brisk purgatives, and nauseating doses of tartar-emetic. If there be reason to believe that suppuration has taken place, and there be extreme tension, with throbbing pain in the ear, and violent headache and delirium, instantaneous relief may be afforded by puncturing the membrana tympani, washing the ear out repeatedly with tepid water, and

facilitating the discharge of matter from the tympanum, by causing the patient to lie on the affected side. If there be swelling or inflammation in the fauces, astringent gargles should be prescribed, or the steam of warm water should be inhaled. If there be reason to believe that the Eustachian tube is obstructed, the air-douche or the ear-catheter may be employed.

2. CHRONIC INFLAMMATION OF THE INTERNAL EAR.

SYMPTOMS.—The principal symptoms of chronic inflammation of the ear, whether external or internal, is a discharge of mucus, mucopurulent, or purulent matter, (otorrhœa), from the external meatus, with deafness more or less complete.

TERMINATIONS.—In caries of the temporal bone ; destruction of the bones of the ear ; cerebral disease ; or permanent deafness.

TREATMENT.—The same as in chronic inflammation confined to the external ear, combined with the use of gargles, the air-douche, or the ear-catheter, with the precautions laid down in works on Diseases of the Ear. The purely medical treatment will be regulated by the existing state of the constitution. If it be connected with scrofula or syphilis, the remedies proper to those diseases ; if combined with skin diseases affecting the head and face, the remedies required by the particular form of skin disease ; if with a deranged state of the digestive organs, aperients and alteratives. Wholesome diet, cleanliness, pure air, proper exercise, and a strict attention to the state of the bowels, with tonics and alteratives, should be particularly insisted on in all forms of the disease.

SURDITAS—DEAFNESS.

CAUSES.—Congenital absence, or excessive contraction of the external meatus. Accumulation of wax ; inflammation and swelling of the meatus ; mucous tumours (polypi) ; osseous tumours ; foreign bodies, such as wool and hairs lodged in the meatus. Inflammation ; calcareous degeneration ; and destruction or extreme relaxation of the membrana tympani. All these causes of deafness are readily observed, and the treatment is sufficiently obvious. The following causes are more obscure :—inflammatory thickening of the Eustachian tube at its faucial orifice ; obstruction of the tympanic orifice of the Eustachian tube from thickening of the mucous membrane ; collections of pus, mucus, or blood in the tympanic cavity ; ankylosis of the ossicula auditus. Diseases affecting the auditory nerve generally implicate the portio dura, and facial palsy of one side results.

Functional deafness may result from concussion, sudden and loud noises, poisons, *e. g.*, aconite, typhus fever, diphtheria.

CHAPTER VIII.

CUTANEOUS DISEASES.

CLASSES.

1. PARASITICAL. 2. NON-PARASITICAL.

PARASITICAL.

Orders.

- | | | |
|----|------------------------|----------------------|
| 1. | DERMATOZOA | Animal Parasites. |
| 2. | DERMATOPHYTA | Vegetable Parasites. |

NON-PARASITICAL

Orders.

- | | | |
|----|-----------------------|------------|
| 1. | EXANTHEMATA | Rashes. |
| 2. | VESICULÆ | Vesicles. |
| 3. | BULLÆ | Blebs. |
| 4. | PUSTULÆ | Pustules. |
| 5. | PAPULÆ | Pimples. |
| 6. | SQUAMÆ | Scales. |
| 7. | TUBERCULÆ | Tubercles. |
| 8. | MACULÆ | Spots. |

GENERAL OBSERVATIONS ON CUTANEOUS DISEASES.

IN order to take a just and comprehensive view of diseases of the skin, the complexity of the structure and function of this part must be duly considered. It exposes a most extensive vascular and exhalant surface, the nature and functions of which bring it into direct and reciprocal relation both with the lungs and the kidneys. It has a proper glandular apparatus—the sebaceous. It contains the organ of touch, and is the seat of common sensation. It is furnished with hairs and nails, which share every derangement of that portion of the skin to which they are attached, and of which they are but modified processes. A surface so richly supplied with blood-vessels, nerves, and glands, must necessarily be very liable to derangements from variations of such external influences as temperature and moisture ; and while its vascular surface

sympathises with every derangement in the circulation of the internal organs, its protective cellular covering, and glandular orifices are exposed to the invasions of parasites.

With regard to arrangement, no collection of phenomena show the imperfection of classification more than do those which pertain to cutaneous affections. As our knowledge of these diseases increases so shall we be able to form a simpler and more rational classification than that in general use. In the present edition, as much has been done towards the attainment of this object as our limited knowledge admits of. The diseases due to parasites are collated, placed in a separate class, and subdivided into two orders.

As for the other orders, the subdivision adopted is convenient; but it must be borne in mind that there are no abrupt lines of demarcation between them. An exanthem, for example, may pass through the successive stages of papule, vesicle, pustule and squama in the natural sequence of morbid action and without the production of any new exciting cause in the system. While, therefore, we adopt the above classification, we must avoid the impression which it is likely to produce, viz., that the orders are marked off from each other by distinctive lines which are not readily overpassed.

DEFINITIONS.

1. *Exanthemata. Rashes.*—Superficial red patches, variously shaped, circumscribed, or diffused, disappearing on pressure, and terminating by resolution, delectescence, or desquamation.

2. *Vesiculæ. Vesicles.*—Small, round, pointed elevations of the cuticle, containing a transparent and colourless, or opaque and pearly, lymph. They break and discharge their contents, and are succeeded by scurf, scales, or open sores. Sometimes their contents are absorbed.

3. *Bullæ. Blebs.*—Vesicles of larger size.

4. *Pustulæ. Pustules.*—Circumscribed elevations of the cuticle, containing pus, and terminating in thick crusts or scabs.

5. *Papulæ. Pimples.*—Small, firm, pointed elevations of the skin, usually terminating in scurf; rarely by ulceration of the summit.

6. *Squamæ. Scales.*—Hard, opaque layers of cuticle, covering papulæ or inflamed surfaces; and continually being detached and renewed.

7. *Tuberculæ. Tubercles.*—Small, hard, solid, persistent tumours, larger than papulæ, with or without an inflamed base, imbedded in the skin, and terminating in resolution, partial suppuration, or destructive ulceration.

8. *Maculæ. Spots.*—Permanent discolorations, or decolorations, of the skin, often accompanied by change of structure.

Diseases of the skin admitting of no exact classification;—lupus, furuncle.

PARASITICAL SKIN DISEASES.

ORDER I.

DERMATOZOA—ANIMAL PARASITES.

ACARUS SCABIEI	The Itch.
ACARUS FOLLICULORUM.	
PHITYRIASIS	Lousiness.
FILARIA MEDINENSIS.	

SCABIES—THE ITCH.

SYNONYM.—Psora, Gale, Rogne.

SYMPTOMS.—The usual seat of this eruption is between the fingers, on the wrists, inside of the forearm, and at the bends of the joints; but it may affect any part of the body except the face. It generally makes its appearance within a few days of the exposure to the contagion, and is preceded for one or two days by itching, increased towards evening and at night, and by all causes which excite the circulation. The eruption consists either of pale rose-coloured or grayish pimples, or of pointed vesicles, containing serum, and raised slightly above the surface. In severe cases these vesicles increase in size, and become filled with pus (scabies purulenta),^h or they are destroyed by friction, and leave small round dark spots. The pimples or vesicles are either single or in small groups; rarely in patches of any size. The disease is accompanied throughout by most distressing itching.

CAUSES.—*Predisposing.* Dryness and warmth of surface; neglect of personal cleanliness. *Exciting.*—Contagion; the *acarus* (Sarcoptes, Cheyletes) *scabiei*. (Fig. 81.) Half an hour after it is placed on the skin it bores perpendicularly through the cuticle, and then obliquely through the softer cells beneath to the cutis in a little circular depression of which it lodges itself.

Fig. 81.



DIAGNOSIS.—The vesicular and pustular forms of scabies are distinguished from *prurigo*, by the latter being a papular eruption, situated generally on the trunk or lower extremities, not contagious, and occurring mostly in old persons. A little black line can usually be traced from the centre of the itch vesicle outwards for a short distance. This is the tunnel formed

by the *acarus*. When scabies assumes the papular form, and the summits of the pimples are scratched off, so as to leave round dark spots, it is difficult to distinguish from *prurigo senilis*. In such cases advanced age affords a probability in favour of the latter; while the fact of more than one member of the same family being affected, is conclusive as to the former. From *lichen*, by the latter

being papular, more clustered, and, if situated on the hand, being on the back of the hand, and not between the fingers. From *herpes* and *eczema*, by the vesicles being more isolated, and in smaller clusters, by the intense itching and by their contagious nature, and often by their situation. The fact that scabies does not attack the face, distinguishes it from all skin diseases having that seat.

TREATMENT.—Sulphur ointment, or an ointment of sulphur and carbonate of potash; sulphur baths; sulphuret of lime, with olive oil; a strong alcoholic solution of stavesacre. Cleanliness and the warm bath, and gentle aperients if required, are useful auxiliaries.

ACARUS FOLLICULORUM.

SYNONYM.—*Demodex folliculorum*. *Steazon folliculorum*.

This parasite (fig. 82) was discovered by Henle and Gustave Simon in 1842. Some observers state that it may be found in the sebaceous follicles of most persons. They occur sometimes singly, sometimes as many as thirteen in a follicle; they usually occupy the duct near the orifice, towards which the abdomen is usually directed, the head lying in the deeper parts of the gland.

According to Mr. Erasmus Wilson the animal varies in length from the $\frac{1}{135}$ to the $\frac{1}{64}$ of an inch. Much difference exists in the length and development of the abdomen. In the form represented in the figure it is much elongated. In the other varieties there are four pairs of legs, and the abdomen is shorter.

Symptoms.—This parasite usually causes no disturbance, and its presence appears to be compatible with a perfectly healthy state of the sebaceous follicles; sometimes, however, it produces pustular and undurated acne of rather an inveterate form.

Treatment.—The follicles should be emptied by means of pressure, and unguentum sulphuris, or a solution of sulphur and camphor in spirit of turpentine, rubbed into the part.

Fig. 82.



PHTHYRIASIS—LOUSINESS.

Three species of louse take up their abode on the human body. They are the following:—*Pediculus capitis*, *P. corporis*, and *P. pubis*.

Symptoms.—They run about and bite the skin, producing intolerable itching, and occasionally pustular eruptions; their eggs (popularly called *nits*) are readily observed attached to the hairs.

Treatment. Mercurial ointment, well rubbed in, is an effectual remedy against the *P. pubis*. The unguentum hydrargyri ammoniati is equally efficacious against the other two species.

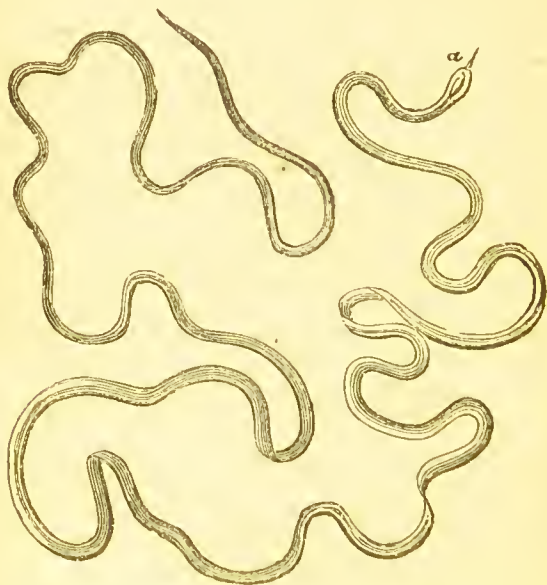
FILARIA MEDINENSIS—GUINEA-WORM.

SYNONYMS.—*Dracunculus*. Hair-worm.

SYMPTOMS.—An itching sensation is felt in the skin of some part of the upper or lower extremities; most frequently in the lower extremities, and especially in the feet. This is soon followed by the appearance of a small vesicle, succeeded by an indolent inflamed swelling like a boil, which breaks and discharges its contents. The head of the worm gradually protrudes through the opening, so that it may easily be seized. Much skill and care are required to withdraw the worm without breaking it; and unsuccessful attempts are apt to be followed by acute inflammation, extensive suppuration, and, in some cases, mortification.

DIAGNOSIS.—The length of the worm varies from half a foot to twelve feet. Its form and size are shown in the subjoined engraving

Fig. 83.



(Fig. 83) of a worm extracted from the heel of a negro, and preserved in the Museum at King's College. The form of the tail is seen at *a*. The head is of a darker colour than the body.

CAUSES.—*Predisposing*. The rainy seasons in the tropical regions of Asia, Africa, and especially Upper Egypt, Nubia, and Guinea. *Exciting*.—The worm in an embryo state pierces the skin (usually the feet and hands), immersed in, or otherwise brought into contact with the water which it inhabits.

TREATMENT.—The worm requires to be very cautiously and patiently extracted, by rolling a fresh portion each day around a quill or roll of cotton, which is to be strapped in the intervals to the neighbouring part.

Suppuration should be promoted by bread poultices.

PROPHYLAXIS.—When the disease prevails among bodies of men, separation from the sound, and scrupulous cleanliness.

ORDER II.

VEGETABLE PARASITES.

EPIDERMMYCOSIS VERSICOLOR .	Cloasma.
EPIDERMMYCOSIS DECALVANS .	Baldness.
EPIDERMMYCOSIS TONSURANS .	Ringworm of the Scalp.
DERMMYCOSIS CIRCINATA . .	Ringworm.
DERMMYCOSIS SYCOSA . . .	Chin Welk.
DERMMYCOSIS FAVOSA . . .	Scall Head.
PLICA POLONICA.	
FUNGUS FOOT OF INDIA.	

EPIDERMMYCOSIS—MOULDINESS OF THE EPIDERMIS, AND DERMMYCOSIS—MOULDINESS OF THE SKIN.*

Under these generic terms are included all diseases of the skin and its appendages, which are known to be due to vegetable parasites.

The confusion in the nomenclature of skin diseases is so complete, that an apology for employing new terms which are at once significant and descriptive of the affection, is scarcely needed. In applying the above-mentioned terms, we shall associate them with the specific names in common use, in order that the diseases to which these refer may be more readily recognised under the new generic term. (J.H.)

EPIDERMMYCOSIS VERSICOLOR.

SYNONYMS.—Pityriasis versicolor, et rubra. Chloasma, Pannus hepaticus. Liver spots.

SYMPTOMS.—Delicate pinkish, greyish, or light yellowish-brown spots, varying in diameter from the $\frac{1}{8}$ th of an inch to an inch or more, maculating the axillary, pubic, and inguinal regions, and gradually extending and becoming confluent, so as to form continuous patches with sinuous margins, covering over the greater part of the chest, abdomen, and shoulders, leaving here and there a small island of healthy skin. The most favourite seat is under cover of the hairs about the pubic region. It never affects parts exposed to the light. The colour varies much: in dark complexions, it has in most cases a light dirty-brown colour, and is marked off from the surrounding healthy skin by a sharply-defined boundary-line; in others the colour is fainter,

* See Glossary.

and resembles that of the skin of a sunburnt face. Occasionally the body is so completely covered with the disease, that only a few small circles of skin are unaffected, forming, it may be, a single cluster, of less extent than the hand, on some part of the trunk. The hue of the diseased skin so closely corresponds to that of the exposed parts of the body that no limit can be distinguished between them, and in such cases I have known the few pearl-like spots of healthy skin to be mistaken, under the name of *albinism*, for the diseased skin.

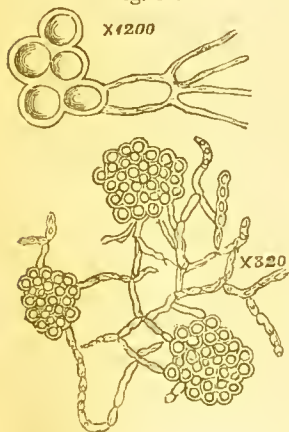
Usually there is no breach of surface of the cuticle, and the disease is apparently nothing more than a spreading discolouration. On examining the discoloured skin attentively, the cuticle is observed to be minutely wrinkled and dryish, and on scraping it with a scalpel we shall find that the discoloured portions may be separated as minute silvery scaly particles, whereas the healthy cuticle is not readily detached.

The disease being entirely confined to the epidermis, is unaccompanied by irritation. Indeed in some cases, when the patient's attention is first arrested by it, he doubts whether or not the discolouration is congenital.

When the disease is of long standing, the cuticle becomes loose, and a minute silvery desquamation takes place continuously.

CAUSE.—A fungus, called *Mycrosporon furfur*. It is composed of minute jointed filaments forming a close network amongst the cells of the cuticle, and developing vast numbers of bright spherical, nearly equal sized spores, coherent into isolated patches of various sizes. Fig. 84.

Fig. 84.



CONTAGION.—The fungus may be easily transplanted to the healthy skin: and this is readily effected by lying between sheets which have been previously used by a person affected with the disease. The fungus never attacks persons before the age of puberty. According to my own observations it is more frequently found in men than in women, and in those who lead a dissolute life. Robust health and cleanliness confer no protection whatever. The gentleman from whom the specimen delineated in fig. 84 was obtained, was of the most scrupulously cleanly habits; yet the disease spread unchecked for two

years. Indeed a daily sponge bath and an occasional Turkish bath appear, probably by moistening the cuticle, to facilitate the development of the fungus.

DIAGNOSIS.—The characteristic appearance of the fungus under the microscope. The cuticle should be scraped off with a scalpel, placed on a glass slide, and wetted with weak solution of ammonia, which renders the cuticular cells transparent. So minute is the fungus, that a $\frac{1}{2}$ object-glass, at least, is necessary. Epidermmycosis versicolor is fre-

quently mistaken for syphilitic eruptions, and the patient subjected to treatment accordingly.

TREATMENT.—Solution of chloride of mercury (gr. i.—iii. to f ʒj.) ; or hyposulphite of soda (gr. xxx. to f ʒj) ; or sulphurous acid daily applied to the skin. The disease rapidly yields, and the skin resumes its healthy colour under this treatment. (J. H.)

EPIDERMMYCOSIS DECALVANS.

SYNONYMS.—Porrigo decalvans. Alopecia. Phyto-alopecia.

DEFINITION.—Mouldiness of the roots of the hair, resulting in baldness

SYMPTOMS.—The hair becomes dry, withered, and of a faded colour. It falls off, and is not regenerated, leaving more or less circular patches of smooth apparently healthy skin. The disease may spread over the whole surface of the skin, and entirely deprive the body of hair.

CAUSE AND PATHOLOGY.—The development of the fungus *Microsporon Audouini* in the roots of the hair, within the follicles, and for a little distance beyond. The plant is composed of minute round and oval spores, and short branched filaments. It forms an uniform layer around the roots of the hair, and invades the cuticle and cortex, rendering the hair opaque and brittle. The plant develops very rapidly.

CONTAGION.—The disease is readily communicated by the spores of the fungus.

TREATMENT.—That recommended for *Epidermmycosis versicolor*.

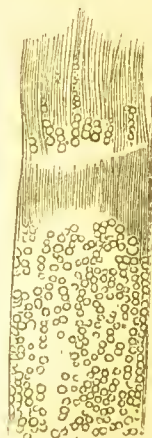
EPIDERMMYCOSIS TONSURANS—RINGWORM OF THE SCALP.

SYNONYMS.—Porrigo scutulata. Herpes tonsdens. Trichosis furfurans. Rhizo-phyto-alopecia.

DEFINITION.—Mouldiness of the roots of the hairs of the head, resulting in their breaking away nearly on a level with the surface of the skin.

SYMPTOMS.—The hairs are thickened, bent at their junction with the skin, and have a withered appearance ; they become very brittle at the roots, and ultimately break off at a distance of one or two lines from the surface of the skin. The stumps present a ragged, split appearance, and readily break if an attempt be made to remove them from the follicle. The disease affects the hair in circular patches, varying in size from half an inch to four inches in diameter. The surface of the patch is dry and scaly, the contiguous cuticle sharing in the disease, and forming characteristic scaly fringes around the orifices of the hair follicles. Vesicles and dry scabs are occasionally formed during the progress of the disease.

Fig. 85.



CAUSE AND PATHOLOGY.—The roots of the hairs are found to be completely pervaded and split up by the *Trycophyton tonsurans*, Fig. 85, a fungus composed of minute round or oval spores and short curved filaments. The spores are destitute of granules.

CONTAGION.—The disease is readily communicated by means of the spores of the fungus.

TREATMENT.—That recommended for *Epidermmycosis versicolor*.

DERMMYCOSIS CIRCINATA—RINGWORM.

SYNONYMS.—*Tinea circinata*. *Herpes circinatus*.

DEFINITION.—Mouldiness of the skin, chiefly of the epidermis, spreading in the form of rings.

SYMPTOMS.—At first a number of very small vesicles arranged in a circular manner upon a red inflamed base. The breadth of the ring formed by the vesicles is usually about a quarter of an inch; the base itself varies from a few lines to one or two inches. The vesicles crack, and the secretion dries up and forms scales which are readily detached. External to these scales a fresh ring of vesicles is developed, which also become converted into scales, and thus the process goes on, the patch constantly widening itself by centrifugal growth, and leaving the parts previously affected in a chronically inflamed and dry scaly condition. The disease chiefly attacks young people, and usually appears upon the face, neck, chest, and arms. When it affects the scalp it takes on the same form and produces the same effect as *Epidermmycosis tonsurans*, with which condition it is most probably identical.

The disease is highly contagious.

The *cause, mode of propagation, and treatment*, are those described under *Epidermmycosis tonsurans*.

DERMMYCOSIS SYCOSA.

SYNONYM.—*Mentagra*. *Tinea sycosa*. *Sycosis mentis*. *Mentagrophyte*. Chin Welk.

SYMPTOMS.—Redness, tension and smarting of the skin of the chin, lower jaw, or upper lip, followed by an eruption of small red points, which, in the course of a day or two, ripen into distinct pointed pustules, traversed by a single hair. After five or six days more, the pustules burst, discharge their contents, and form thin brownish scabs, which fall off, and are sometimes not renewed, the disease terminating in from ten days to a fortnight, but usually successive crops of pustules are developed, and in extreme cases, the skin is covered with a thick, yellowish-brown crust, in which the hairs are matted. When the disease has continued for some time the beard falls off. In chronic

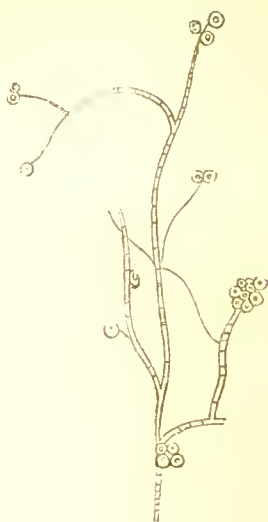
cases the skin of the parts affected is covered with tubercles. The disease may attack any part where the hairs are strong. It is often very obstinate.

CAUSE AND PATHOLOGY.—The disease is due to the development of the *Microsporon mentagrophytes* (fig. 86), which invades the hair follicles and forms a sheath around the roots of the hairs. The fungus luxuriates in the epithelial layer of the hair follicle, and sets up inflammation in the subjacent vascular parts.

DIAGNOSIS.—The spores are very minute, and the filaments branch at acute angles and are annulated.

TREATMENT.—The hairs should be removed from the affected follicles by means of a pair of pincers and the subsequent application of a solution of corrosive sublimate (gr. x. to f. ℥j.), by means of a camel hair brush. Epilation is usually easy and painless, for the tendency of the disease is to loosen the hair.

Fig. 86.



DERMMYCOSIS FAVOSA.

SYNONYM.—Favus. Tinea favosa, annularis, et rugosa. Porrigo lupinosa, et seutulata. Scall head. Honeycomb scall.

VARIETIES.—Porrigo favosa; porrigo seutulata; porrigo decalvans.

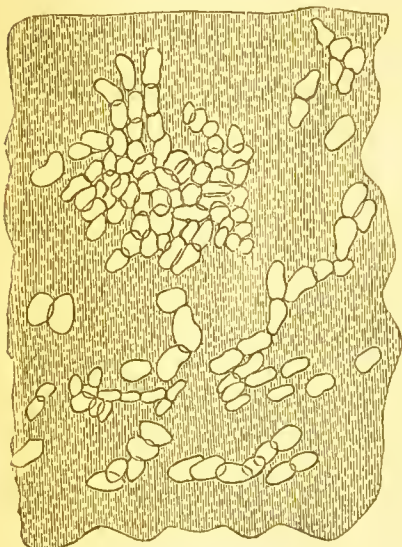
SYMPTOMS.—Small round pustules, usually seated on the hairy scalp, and containing a yellow matter, which concretes so as to form a hard, prominent scab, presenting a central depression (*favus*). The disease generally attacks children, but is not confined to young persons. There are no febrile symptoms. The primary seat of the disease is the hair follicles.

It is not confined to the scalp, but may attack the chin, eyebrows, or forehead, and, in rare instances, the trunk or extremities. These scabs have an offensive odour, resembling that of the mouse. When the pustules are closely set, the yellow crusts become confluent, the whole presenting a honeycombed appearance. If few pustules only appear, and their development be uninterfered with, the favi become greatly enlarged, sometimes to the diameter of $1\frac{1}{2}$ inch; and form circular, yellow, dry elevations, depressed in the centre, and with smooth rounded varnished margins. These large crusts are partly discrete and partly confluent. This is the variety of the disease known as *Porrigo lupinosa*. When the disease is of some duration, it may be seen at the same time in all its stages—the red patches, the cluster of yellow

pustules, crusts of various thickness, and bald spots. If the scabs be removed by poulticing, the favi are reproduced upon the clean raw surface. When the disease has disappeared, the hair is slowly reproduced, and sometimes permanent baldness results. The nails are occasionally affected with the disease.

CAUSES AND PATHOLOGY.—The disease is due to the development of the *Achorion Schönleini* (fig. 87) in the deeper layers

Fig. 87.



of the epidermis, and upon the surface of the cutis. At first the deeper epithelial cells are disturbed, and the cuticle, and subsequently the whole of the epidermis, becomes raised, and a circular, yellowish-white spot is formed, which increases in size, assumes a sulphur yellow colour, and becomes a favus. When, as is most commonly the case, the parasite attacks the hair follicles, the depressed centre of each favus is occupied by a hair, which becomes thickened, opaque, non-elastic, and may readily be removed. When the crusts are removed, soaked in ammonia, and examined, they are found to be chiefly composed of the spores and large-jointed spore containing filaments of the fungus.

DIAGNOSIS.—The presence of the fungus distinguishes the disease from eczema and impetigo. The scabs, moreover, of eczema have never the characteristic alveolar depressions. The pustules of impetigo are prominent and convex, seated upon an inflamed base, and their purulent contents have no trace of fungi.

PROGNOSIS.—The disease is often obstinate and of long duration.

TREATMENT.—The hair must be cut close with sharp scissors, and well washed, and the scabs must be softened with warm fomentations or poultices. The best local application, in the great majority of cases, is the iodide of sulphur ointment: when this does not prove successful, a strong solution of nitrate of silver, or the dilute mineral acids, especially the sulphuric, or creasote, or a saturated solution of sulphurous acid, may be used. The mixture of vapour of iodine and sulphur applied to the patch through a flexible tube is strongly recommended by Dr. Burgess. The powder used to generate the vapour consists of from four to eight grains of iodine to an ounce of sulphur; the vapour to be applied three times a day. The general treatment consists in the use of tonics, especially the preparations of iron, with aperients as often as necessary.

PLICA POLONICA.

This is a disease of the hair allied to the present class of cutaneous disorders, but almost unknown in this country. It consists in an inflamed and tender state of the scalp, and a swollen condition of the hairs, which are glued together into a compact mass by a viscid and offensive secretion. Two parasitic plants—the *Trycophyton tonsurans* and *Tricophyton sporuloides*—are said to accompany it, and are thought to be the cause of it. Nothing is known of the appropriate treatment, but the disease seems to be aggravated by cutting the hair. The best chance of cure would seem to be afforded by the application of stimulants in the form of vapour, such as the mixed vapour of iodine and sulphur.

FUNGUS FOOT OF INDIA.

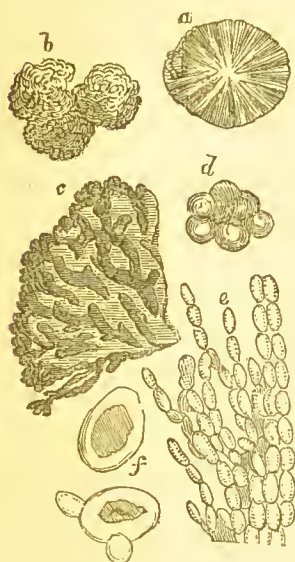
SYNONYMS.—Madura foot. Podelkoma. Mycetoma. Ghootloo Mahdeo. Kirudeo. Dr. H. V. Carter, of Bombay, has given a full description of this disease, and an elucidation of its cause, in the Trans. of the Medical and Physical Society of Bombay. The following is a brief summary of the principal facts:—

SYMPTOMS AND PATHOLOGY.—The disease appears as a flattened swelling of the integument, from which the cuticle is thrown off, leaving a white surface, which presents numerous pinkish spots, and on making sections of the cutis these are found to be the extremities of pink, red, or orange-brown streaks radiating through the corium. This deposit is composed of minute bright globules, measuring $\frac{1}{1000}$ to $\frac{1}{500}$ of an inch in diameter. Occasionally, spherical groups of spores are seen. After a time the whole foot becomes swollen, and greyish depressed spots appear, composed of a thin layer of cuticle, which finally ruptures and discloses the orifice of channels, allowing the passage of a probe for a greater or less distance. Numerous depressions and circular apertures form over the surface of the dorsum, sides, and heel of the foot; they are large enough to admit a pea or a shot, and numbers of small round granules like fish-roe or poppy-seeds are discharged with an ichorous offensive fluid from the orifices. The foot continues to enlarge, and becomes much misshapen. The surface is riddled with numerous round holes of various sizes, and they lead down to canals and cavities which pervade all the textures of the foot, including the bones. The lower ends of the tibia and fibula are often excavated into numerous communicating cavities, some of which are large enough to lodge a hazel nut. The sinuses and excavations are filled with mahogany-brown or pink granules. A section of the diseased foot presents great indistinctness of parts, the tissues being everywhere excavated, changed, and in places infiltrated with the coloured granules. The disease attains its maximum development in about four years. It

may continue for twelve years. No acute pain attends its progress, but merely a deep-seated aching. The health suffers considerably, and the patient becomes emaciated and weak.

In one case the disease has been observed to attack the hand.

Fig. 88.*



CAUSE.—The development of a fungus, called by Mr. Berkeley *Chionyphe Carteri*. It occurs in globular masses, varying in size from a pin's head to that of a bullet (*a b c*, fig. 88). They are friable, and are black upon the surface, where they present numbers of minute tubercles (*d*). Sections show a radiated arrangement (*a*). Minutely examined, they are found to be composed of radiating tubular fibres, which branch and unite towards the circumference (*c*). Near the surface they become beaded (*e*). Interspersed among these fibres are the spores (*f*). Dr. Carter believes that the fungus is introduced from without, the spores gaining admission through the orifices of the sweat ducts, or any slight abrasion of the surface. The disease has occasionally followed a prick from a thorn. Farm labourers between the ages of 17 and 50, who go about with their feet uncovered, are those most liable to the attacks of the parasite.

DISTRIBUTION.—The disease is endemic in the Bombay and Bengal Presidencies. ‘Kattiawar, Kutch, Guzerat, Sind, the Deccan, Lower Concan, are known localities in the former Presidency. Aden appears doubtful. On the Madras side Gunttoor, Bellary, Madura, Cuddapah are well-known localities; parts of Mysore, and, it is said, Trichinopoly.”† In the Bengal Presidency it appears to prevail around Sirsa, and patients come from Bicaner, Bhawalpore, and Hissar.

TREATMENT.—In the latter stages, amputation of the foot is the only means of removing the disease. In the earlier stages, the application of a strong solution of corrosive sublimate or hyposulphite of soda.

* *b*. A globular mass of the fungus, natural size. *a*. Another in section.

c. A fourth part of *a* slightly magnified.

d. Spherical granules from outer surface of *b* magnified, *e* and *f*, beaded filaments and spores highly magnified.

† H. V. Carter, M.D., in Trans. Med. and Phy. Soc., Bombay, 1860, p. 128.

NON-PARASITICAL SKIN DISEASES.

ORDER I.

EXANTHEMATA—RASHES.

RUBEOLA . . .	Measles (p. 349).
SCARLATINA . .	Scarlet-fever (p. 353).
ERYSIPELAS . .	St. Anthony's Fire (p. 302).
ERYTHEMA . . .	Inflammatory-blush.
URTICARIA . . .	Nettle-rash.
ROSEOLA . . .	Rose-rash.

ERYTHEMA—INFLAMMATORY-BLUSH.

SYNONYMS.—Intertrigo; maculæ volaticæ; tooth-rash; gum.

SPECIES.—Erythema fugax; erythema læve; erythema papulatum; erythema tuberculatum; erythema centrifugum; erythema nodosum.

SYMPTOMS.—Red patches of variable form and extent disappearing on pressure, with little or no swelling, heat, pain, or fever. Not contagious, nor in itself attended with danger.

TERMINATIONS.—In resolution without desquamation, or with slight desquamation (*E. fugax* and *E. læve*); or in a sero-purulent exudation of a disagreeable odour (*E. intertrigo*).

CAUSES.—Friction and pressure; heat and cold; acrid discharges, as those of coryza, leucorrhœa, or gonorrhœa, and the urine and fæces; irritation of internal parts, as in dentition; difficult menstruation; dyspepsia; tension of the skin, as in anasarca.

DIAGNOSIS.—From *erysipelas*, by the redness being lighter and more superficial, and the swelling less; by the absence of heat and pain; and by its milder character, and more favourable termination. From *roseola*, by the peculiar rosy tint of the latter. From *rubeola* and *scarlatina*, by the semi-lunar patches of the first, and by the great extent and deep-red hue of the last. Also by the peculiar constitutional symptoms and contagious character of these diseases.

PROGNOSIS.—Favourable; but it is sometimes chronic and permanent, especially when occurring on the legs in aged persons.

TREATMENT.—When idiopathic, it soon disappears of itself, or yields to gentle aperients, spirit lotions, and the warm bath. If symptomatic, the treatment is that of the primary disease.

The following varieties of erythema deserve attention:—*Erythema papulatum*, occurring in young persons of both sexes, on the trunk and upper extremities, in small, round, and slightly-prominent patches, which disappear entirely in the course of a few days; *erythema tuberculatum*, in which the patches are larger, more prominent, and more

permanent; *erythema nodosum*, which occurs chiefly in children and young persons of both sexes, on the extremities, especially the forepart of the leg, its form rounded or oval, its size varying from that of a fourpenny-piece to that of a five-shilling piece, at first slightly raised above the surface, but in a few days assuming the form of red painful tumours. The colour gradually changes from red to blue; the tumours soften, and disappear in from a week to a fortnight. It is generally preceded by debility. *Erythema centrifugum*, appearing mostly on the cheek, as small round raised patches, which gradually spread from a small pimple till they cover a considerable extent of surface. Heat and redness continue for several days, and are often connected with menstrual disorders.

These varieties of erythema either disappear of themselves, or under the use of gentle aperients, and cold lotions, such as Goulard's lotion, or an alkaline solution containing a drachm of carbonate of potash to a pint of water, may be kept constantly applied. The use of tonics is strongly indicated in *E. nodosum*.

URTICARIA—NETTLE-RASH.

SYNONYMS.—Essera; aspretudo; febris urticata; papulæ cuticulares.

VARIETIES.—1. *Urticaria evanida*; 2. *Urticaria febrilis*.

1. URTICARIA EVANIDA.

SYMPTOMS.—An eruption resembling in appearance, and in the intolerable itching which accompanies it, the stinging of nettles. The spots often appear suddenly, especially if the skin be rubbed or scratched, and seldom last many hours, sometimes not many minutes, but vanish, to appear on another part of the skin. Sometimes the rash assumes the form of long wheals, as if the part had been struck with a whip or cane. The swellings are always firm and solid, and contain no liquid. In some persons, the eruption lasts only a few days, in others many months or years, appearing and disappearing at intervals. The rash generally disappears in the daytime, to return in the evening, and is accompanied by slight feverishness. It terminates in desquamation.

CAUSES.—*Predisposing*. Peculiar constitution. *Exciting*.—Handling the leaves of the common nettle. Shell-fish; mushrooms; honey; vinegar; cucumbers; salad. Strawberries and several other fruits and articles of diet will cause urticaria in certain persons; also valerian, turpentine, and copaiba.

DIAGNOSIS.—By its close resemblance to the sting of the nettle, the itching that attends it, and its fugitive character.

PROGNOSIS.—It generally disappears under the use of simple remedies; but may last for months or years.

TREATMENT.—If caused by irritating food, an emetic, followed by a gentle aperient. In chronic cases, warm or vapour, alkaline or sulphur, baths; with a strictly-regulated diet, aperients, and alteratives. In obstinate cases, Fowler's solution (five or six drops three times a day). The smarting may be allayed by lotions of acetate of lead, or cyanide of potassium, or by the warm bath.

2. URTICARIA FEBRILIS.

SYMPTOMS.—This is generally caused by some article of food which has disagreed with the patient. There is more or less fever or constitutional disturbance, followed by heat and tingling of the body; and then by an eruption, beginning on the shoulders, loins, and inner surface of the arms and thighs, and round the knees, consisting of irregularly-shaped pale blotches, surrounded by a deep-red border, but soon assuming an uniform deep-red colour, and accompanied by intense itching. The blotches appear and disappear several times in the course of the disease, and gradually subside in a few days or a week. There is generally an increase of itching and smarting towards evening. The *treatment* is that of urticaria evanida, but more active. After an emetic of ipecacuanha, a saline aperient may be given three or four times a day. (Magnes. Sulph. $\mathfrak{J}\text{i}$.,* Magnes. Carb. gr. x., Vin. Antimonialis $\mathfrak{z}\text{ss}$. Aq. Menthæ pip., Aquæ, $\mathfrak{a}\mathfrak{a}$ $\mathfrak{z}\text{ss}$.)

ROSEOLA—ROSE-RASH.

SYNONYMS.—Rosalia; rosacia; rubeola spuria.

VARIETIES.—Roseola infantilis; roseola æstiva; roseola autumnalis; roseola annulata.

SYMPTOMS.—Slight febrile symptoms, succeeded by deep-red patches of various size and form, appearing on different parts of the body, and generally disappearing in one or two days, or a week.

CAUSES.—Teething; irritation of the stomach and bowels; drinking cold water when the body is heated; severe exercise. The disease is sometimes epidemic, and it occasionally precedes the eruption of the small-pox, occasioning some difficulty in the diagnosis.

DIAGNOSIS.—From measles and scarlet fever, by the mildness of the constitutional symptoms, and the absence of the catarrhal symptoms of the one, and the sore throat of the other.

PROGNOSIS.—A favourable termination after a few days or a week.

TREATMENT.—Saline aperients with small doses of tartar-emetic two or three times a day; and an occasional warm bath.

* $\mathfrak{J}\text{i}$. = 100 grains.

The following varieties require attention :—*Roseola infantilis*. An eruption of numerous small distinct circular patches, of a deep rose-red colour, occurring in infants from dentition or intestinal irritation. —*Roseola æstiva*. This form is most common in children and females. It is preceded by symptoms of fever, sometimes of considerable severity, accompanied by delirium and even by convulsions. The rash, which is of a deep-red colour, and attended with itching and pain, and sometimes with an inflamed throat, with some difficulty in swallowing, commonly appears between the third and seventh days on the face and neck, whence it rapidly spreads over the rest of the body. It lasts about three or four days, and then disappears. The *roseola autumnalis* is a less severe affection, occurring also chiefly in children, and presenting larger patches, seated mostly on the upper extremities. *Roseola annulata*, appearing, as the name implies, in rosy rings, enclosing a portion of healthy skin, and gradually spreading. The rash is most common on the belly, loins, buttocks, and thighs. It may be acute or chronic, and is generally dependent upon some disorder of the alimentary canal.

ORDER II.

VESICULÆ—VESICLES.

VARICELLA	Chicken-pox (p. 349).
ECZEMA	Running Scall.
HERPES	Tetter.
MILIARIA	Miliary-fever.

ECZEMA—HUMID TETTER.

SYNONYMS.—Running scall; crusta lactea.

SPECIES.—1. Acute; 2. Chronic.

1. ACUTE ECZEMA.

VARIETIES.—Eczema simplex; eczema rubrum; eczema impetiginodes.

SYMPTOMS.—An eruption of small slightly-raised vesicles, crowded together on broad irregular patches of bright-red skin, accompanied by severe tingling and smarting. The fluid in the vesicles soon becomes opaque and turbid, and, in four or five days, the vesicles burst, the fluid is discharged, and dries into thin yellowish-green scabs. Fresh vesicles form on the surrounding skin, while the parts already affected are kept moist by constant exudation. When the eruption is of some standing, the skin presents a highly-inflamed surface, studded with a large number of minute pores, which are covered with thin white membranes. Its usual duration is from a week to a month.

CAUSES.—*Predisposing*. The female sex; the seasons of spring and autumn. *Exciting*.—Intense heat; the irritation of blisters; frictions with mercurial (eczema mercuriale); the handling of dry powders, flour, metals, &c. Contagion?

DIAGNOSIS.—From *scabies*, by the vesicles of eczema being more clustered and less pointed; by the smarting of eczema contrasted with the itching of scabies. From *miliaria*, by the absence of severe constitutional symptoms; and of profuse perspiration. From *lichen agrius*, by the presence in the latter of distinct papulæ, and by the deeper colour of the skin. From *psoriasis*, by the moisture, and the presence of scabs.

PROGNOSIS.—*Favourable*, but often difficult of cure.

TREATMENT.—The mineral acids internally administered, cooling drinks, simple diet, warm baths, water-dressing, such as local baths of marsh-mallow or bran, or poultices of potato-flour. The distressing tingling and smarting of the rash may be relieved by decoction of poppy-heads, or by a lotion consisting of two grains of the cyanide of mercury, or three grains of the cyanide of potassium, to an ounce of distilled water. Preparations of sulphur, and greasy applications generally, should be avoided. Alkaline lotions are often of much service.

The following varieties require special notice:—*Eczema simplex*.—A mild form, free from constitutional disturbance, mostly attacking women and young children on the arm and forearm, and between the fingers, generally terminating in resolution. *Eczema rubrum*.—The skin is inflamed, hot, and tense, of a bright-red colour, and covered with small vesicles surrounded by an inflamed areola. The rash generally terminates in about a week, with slight exfoliation of the cuticle; but in more severe cases, the inflammation increases, the vesicles coalesce, the contained serum becomes opaque, and at length escapes as an irritating fluid, which forms loose thin incrustations, and these falling off, display a highly-inflamed surface. The disease either disappears in two or three weeks, the healing process beginning at the margins, or it becomes chronic. *Eczema impetiginodes*.—In this form, the inflammation, which is still more acute and rapid in its progress, is accompanied by much swelling and tension, and some fever; and the contents of the vesicles becoming purulent dry into soft yellow scabs, which fall off, and are reproduced, displaying a red inflamed surface covered with an ichorous serum. It generally terminates in about a month, the skin gradually assuming a more healthy appearance; or it runs into the chronic form. It is distinguished from impetigo by being at first vesicular, whereas impetigo is a pustular disease from the beginning; and by the thinner scabs.

2. CHRONIC ECZEMA.

SYMPTOMS.—This is a sequel of the acute form, and often very intractable. The skin, from the continued abundant discharge of acrid serum and the reproduction of the vesicles, is highly inflamed and marked by

fissures at the joints. Sometimes, however, there is no exsudation, but the surface is cracked and covered with shining crusts, beneath which the skin is of a bright-red colour. The disease often spreads from a small point over a considerable extent of surface, and is accompanied by intense itching and smarting, which is particularly distressing when the eruption occupies the inner surface of the thighs, the verge of the anus, or the vulva. When it attacks the face, the conjunctiva of the eye is involved, and there is much smarting, with some intolerance of light. The eruption often lasts for years, being heightened and renewed in spring and autumn; and sometimes, after the resources of art and the patience of the sufferer are exhausted, rapidly disappears.

CAUSES.—*Predisposing.* Obscure. *Exciting.*—Intestinal irritation; painful dentition; dysmenorrhœa.

TREATMENT.—Mineral acids administered internally and with one of the bitter infusions, alkaline lotions externally. An alterative aperient should be given at bedtime occasionally. In obstinate cases ℥iii. to ℥v. of liquor arsenicalis may be prescribed. The sulphur bath, or a bath containing three ounces of sulphide of potassium, may be used with advantage. Vapour baths, or the vapour douche, may also be recommended. The itching and smarting are best allayed by the zinc ointment mixed with spirits of wine (ung. zinci. ʒi. spt. vin. rect. ʒi.) smeared over the surface, and renewed once or twice a day; or by simple cold-water dressing. A handkerchief, moistened with a teaspoonful of chloroform, placed near the seat of irritation, and covered with the bed clothes, often allays the smarting. A solution of nitrate of silver (ten grains to the ounce) will also sometimes afford great relief.—(G.)

HERPES—TETTER.

SYNONYMS.—Dartre; olophlyctide.

VARIETIES.—Herpes phlyctenodes; herpes labialis, and preputialis; herpes zoster; herpes circinatus; herpes iris.

SYMPTOMS.—The rash begins as circumscribed groups of distinct vesicles on an inflamed base; but the vesicles soon coalesce, and their contents, which were at first watery, soon become yellowish-white or yellow, escape and form a scab. This soon falls off, leaving an inflamed surface, which rapidly heals. The eruption is commonly preceded by slight constitutional symptoms, and sometimes by acute darting pain, which, when the eruption has made its appearance, changes to heat and smarting. The disease is rarely attended with any danger, and generally lasts about a week or ten days.

Herpes phlyctenodes is the name given to those varieties of the disease which have no particular seat. *Herpes labialis* occupies, as the name implies, the lips, but may extend to the nose, cheeks, and chin; it also attacks the mucous membrane of the lips and mouth. It is a very common accompaniment of catarrh, and of inflammatory

affections of the mucous membrane of the mouth, throat, and stomach; and it often appears during an attack of pneumonia and ague, and concludes an attack of relapsing fever. *Herpes preputialis* attacks the internal or external surface of the prepuce, and is preceded and accompanied by itching and smarting. It is easily distinguished from syphilis when recent, and afterwards by its history. The sore remaining after the vesicles have burst is superficial, and readily heals if the two surfaces of the prepuce be separated with lint. *Herpes zoster*, *zona*, or *the shingles*, is very characteristic in its appearance, position, and course. As the name implies, it surrounds the body like a zone or girdle, beginning somewhere about the mesian line, and travelling round one-half the body, following the direction of the intercostal nerves, below the nipple, at the lower part of the back and groin, or at the upper part of the thigh. It is often preceded for several days, or even longer, by very acute darting pains. It runs a mild course, and disappears in two or three weeks. *Herpes iris*.—A very rare variety, consisting of four rings of different shades of colour.

CAUSES.—*Predisposing*. The female sex; youth and middle age; but it occasionally occurs in old people. *Exciting*.—Catarrh; inflammation of the mucous membranes; indigestion.

DIAGNOSIS.—From *pemphigus*, by the smaller size and greater number of the vesicles. From *eczema*, by the greater distinctness of the vesicles, and, generally, by the smaller size of the patches. The situation of herpes labialis and preputialis, and the peculiar course and arrangement of herpes zoster, serve to distinguish those varieties.

PROGNOSIS.—*Favourable*. The disease lasts from a week or ten days to a month, and in rare cases longer.

TREATMENT.—Gentle aperients with antimonials, a regulated diet, and local applications of warm mucilaginous liquids. The constitutional treatment must be determined by the age and state of system. The vesicles may be punctured with advantage, and friction should be guarded against. Mild cases get well without treatment.

MILIARIA—MILIARY FEVER.

SYMPTOMS.—This disease sets in with rigors, extreme debility, depression of spirits, and a sense of tightness and oppression about the præcordia, with shortness of breath, and, in some instances, a teasing cough, followed by increased heat of surface, with wandering pains and restlessness. After these symptoms have continued from two to five or six days, a *profuse sweat*, of a sour, rank odour, makes its appearance, accompanied by a harassing pricking or itching of the skin. On an *uncertain day*, a number of small red or white papulæ, about the size of millet-seeds, perceptible to the touch, are observed first upon the neck and breast, whence they gradually extend to the trunk and

extremities. After *ten or twelve hours*, a small vesicle appears upon the top of each pimple. The contents of the vesicles are at first transparent, but afterwards become white; and they have a peculiarly offensive odour. In *two or three days* the vesicles break, and are succeeded by small crusts, which fall off in scales; or the disease terminates in resolution, or by desquamation. The febrile symptoms do not subside on the appearance of the eruption, but after a variable interval.

CAUSES.—*Predisposing*. Lax habit of body; childhood; old age; the female sex; the period of childbirth; debility, however induced; excessive evacuations; long-continued and copious menstruation; leucorrhœa; the presence of irritating matter in the alimentary canal; abuse of tea-drinking. *Exciting*.—Immoderate sweating, produced by excessive heat, or by heating medicines. Too much bed-clothes and warmth in the puerperal state.

DIAGNOSIS.—By the uncommon anxiety and dejection of mind; the profuse sweating, and the peculiarly fetid, rank odour of the perspiration. Afterwards, the characteristic appearance of the eruption.

PROGNOSIS.—*Favourable*. The fever assuming a mild form, and remitting on the appearance of the eruption; the papulæ of a florid red colour. *Unfavourable*.—The persistence of the sweating, with increase of fever after the appearance of the rash; great anxiety and depression of spirits; profound coma; the sudden disappearance of the eruption, followed by great prostration of strength, anxiety, shortness of breath, rapid, weak, and intermitting pulse, violent vomiting, delirium, and convulsions; the appearance of petechiæ interspersed among the papulæ; anasarca swellings.

TREATMENT.—*Indications*. I. To diminish the immoderate heat and sweating. II. To support the strength of the patient.

I. The first indication will be accomplished,

(a) By the cautious application of *cold*;—the air of the bed-room should be cool; part of the bed-clothes should be removed, and the patient should be desired to lie with the arms exposed.

(b) By gentle *saline aperients*, with the milder mercurial preparations.

(c) By mineral *acids*; especially the dilute sulphuric acid, given in the infusion of roses, or with decoction of bark or quinine.

II. The second indication requires,

Ammonia, or wine; and, where there is great restlessness, opium.

The skin may be washed with a weak solution of chloride of lime.

ORDER III.

BULLÆ—BLEBS.

PEMPHIGUS . . .	Vesicular Fever.
RUPIA . . .	Atonic Ulcer.

PEMPHIGUS—VESICULAR FEVER.

SYNONYMS.—Bullæ; phlyctena; pompholix; hydatis; febris bullosa; febris vesicularis.

VARIETIES.—Pemphigus infantilis; pompholix solitarius; pompholix diutinus.

SYMPTOMS.—The rash is ushered in by the usual symptoms of the cold stage of fever; lassitude, headache, sickness, oppression, frequent pulse, and, in some instances, delirium. On an *uncertain day* an eruption takes place of red circular patches, which soon terminate in pellucid blisters, similar to those produced by a burn, resting on an inflamed areola, and distended with a straw-coloured serum. They appear on the face, neck, trunk, arms, mouth, and fauces, and vary in size from that of a sixpence to that of a half-crown. In a few days the blisters either break and discharge a yellowish, bland, or sharp ichorous fluid, or they begin to shrink, and in a short time disappear.

Pemphigus infantilis attacks young infants in lying-in hospitals. It has been mistaken for syphilis. *Pompholix solitarius* is characterised by the appearance of a single bleb at a time, on successive days, or at short intervals. *Pompholix diutinus* is a chronic disease, occurring, for the most part, in middle-aged and old men, lasting for a considerable time, and sometimes extending over the entire body.

CAUSES.—*Predisposing*. The male sex; adult and old age; summer season. *Exciting*.—Unwholesome and scanty food, bad ventilation, and all the causes of cachexia. Specific infection?

DIAGNOSIS.—From *vesicular eruptions*, by the large size and isolation of the vesicles. From *rupia*, by the absence of thick scabs. From *ecthyma*, by the contents of the blebs being transparent. From *erysipelas*, by the regular form and isolated situation of the blisters.

PROGNOSIS.—Generally *favourable*, but often chronic.

TREATMENT.—That of the concomitant fever, and varying with its type. In common cases, gentle aperients, with quinine, and acid drinks. When the disease occurs in cachectic constitutions, alteratives with tonics or stimulants, and a generous diet, will be required.

The local treatment will consist in puncturing the vesicles as they appear; and if there is much pain, applying warm poultices or fomentations to the inflamed spots.

RUPIA—ATONIC ULCER.

SYNONYM.—Ulcus atonicum.

VARIETIES.—*Rupia simplex*; *rupia prominens*; *rupia escharotica*.

SYMPTOMS.—This disease consists in round, flattened, and isolated blebs, about the size of a shilling, filled with serum, which changes after a time to pus. These blebs shrink, and become covered with thick brownish scabs, which, when they fall off, leave ulcers that either heal or continue open for a while. The disease attacks weakly and cachectic subjects, and runs a chronic course, lasting from a few weeks to several months. Its most common seat is the lower extremities.

Rupia simplex is the mildest form of the disease, and answers to the above description. *Rupia prominens* is named from the greater thickness of the scabs, which are formed by several layers of hardened secretion, assume a conical shape, and an appearance not unlike that of an oyster-shell in miniature. The blebs are larger, and the inflammation and subsequent ulceration more extensive than in *rupia simplex*. *Rupia escharotica* affects infants in the interval from birth to the first dentition, is accompanied by much constitutional disturbance, and sometimes terminates fatally. The ulcers left after the separation of the scabs heal slowly, secrete a fetid sanies, and are apt to spread.

CAUSES.—*Predisposing*. A cachectic state of the system. *Exciting*.—Obscure.

DIAGNOSIS.—From *pemphigus*, by the thick laminated scab, the inflammatory areola, and subsequent ulceration. From *ecthyma*, by the blebs at first containing serum; but in severe cases, the secretions soon becoming purulent, renders the diagnosis difficult.

PROGNOSIS.—*Favourable*, except in the more severe cases of *rupia escharotica*.

TREATMENT.—*Local*. Warm baths; alkaline baths; emollient applications, and if the ulcerations be obstinate, nitrate of silver, dilute mineral acids, or stimulating ointments. *General*.—Tonics or stimulants, with alteratives, according to the state of the patient; and strict attention to diet, ventilation, and cleanliness:—the treatment, in a word, of cachexia.

ORDER IV.

PUSTULÆ—PUSTULES.

VARIOLA	.	.	.	.	Small-pox (p. 339).
VACCINA	.	.	.	.	Cow-pox (p. 346).
ECTHYMA	.	.	.	.	Ecthyma.
IMPETIGO	.	.	.	.	Running Tetter.
ACNE	.	.	.	.	Copper Nose.
EQUINIA	.	.	.	.	Glanders (p. 380).

ECTHYMA.

SYNONYMS.—*Farunculi atonici*; *phlyzaeia agria*; *scabies fera*.

SYMPTOMS.—The eruption begins in the form of distinct inflamed circumscribed spots, which increase till they attain a considerable size. Pustules form on the centre, and sometimes enlarge till they closely resemble the larger bullæ of *rupia*. In two or three days the pustules dry up, and thick scabs form, which falling off, leave a purple discoloration of the skin, or in severe cases, and in greatly-impaired constitutions, an unhealthy ulcer. The eruption is sometimes accompanied by pain, and by slight febrile symptoms.

CAUSES.—*Predisposing*. Childhood and old age. *Exciting*.—All the causes of cachexia.

DIAGNOSIS.—From *acne*, *impetigo*, *sycosis*, *favus*, and *scabies purulenta*, by the larger size of the pustules, and their inflamed and indurated base. From *variola*, by their size, the absence of the central depression, and their non-contagious nature. From *vaccina*, by the cellular structure of the latter, and its contagious nature.

PROGNOSIS.—*Favourable*; but sometimes chronic and tedious.

TREATMENT.—Emollient applications, and if the ulcers assume a chronic form, nitrate of silver, or the dilute nitric or muriatic acid, or stimulating ointments. Gentle aperients and alteratives, mineral tonics, wholesome food, pure air, exercise, cleanliness, and sea bathing.

IMPETIGO—CRUSTED TETTER.

SYNONYMS.—Running tetter; scale; cowrap.

VARIETIES.—*Impetigo figurata*; *impetigo sparsa*; *impetigo larvalis*.

SYMPTOMS.—The eruption appears in the form of clusters of small pustules, slightly raised above the skin, which burst in from one to three days, and discharge a purulent fluid, that hardens into thick,

yellow, semi-transparent incrustations, resting on an irregular, inflamed base, moistened by a sero-purulent fluid. The eruption may disappear in a few weeks, or it may continue for months or years, the existing patches being succeeded by fresh groups of pustules. There is some constitutional disturbance, with intense heat and itching of the parts affected.

Impetigo figurata generally occurs in defined patches on the cheeks, but may attack any part of the body. It is most common in spring, and in young children, especially during dentition. *Impetigo sparsa* is more irregular in its distribution, and is most frequently seen on the extremities, and around the joints. Its most common period is the autumn; and it may assume either an acute or chronic form. *Impetigo larvalis* attacks the scalp, ears, and lips in infants. It may also occur on the cheek, which it covers with a thick, yellowish-white crust, resembling a mask, whence its name. In one of its forms it receives the name of *crusta lactea*.

CAUSES.—*Predisposing*. The seasons of spring and autumn; infancy and childhood; the lymphatic temperament. *Exciting*.—The application of irritating substances to the skin; unwholesome diet; impure air; want of cleanliness. This disease is not contagious.

DIAGNOSIS.—The pathognomonic character is the formation of clusters of small pustules (psudracia), succeeded by scabs of varying tints, from whitish-yellow to dark brown. When it attacks the chin, from *sycosis*, by the smaller size of its pustules, and the less copious exudation. From *favus*, by not being contagious, and not destroying the hair; and by the peculiar character of the scab. (See Dermmycosis favosa.)

PROGNOSIS.—*Favourable*, in the young and in its acute forms. Obstinate and difficult of cure in the old and in chronic forms.

TREATMENT.—Emollient applications, tepid baths, the vapour douche, and gentle aperients. The troublesome itching may be relieved by a prussic-acid lotion, containing half an ounce of dilute prussic acid, and the same quantity of alcohol, in an eight-ounce lotion. In chronic impetigo, in addition to tepid baths, alkaline lotions to the skin; the sulphur bath; the dilute acids, or a weak solution of nitrate of silver. Stimulating ointments (sulphuris iodidi ℞ss.,* ung. simp. ʒi.) may also be usefully applied. In obstinate cases, Fowler's solution.

ACNE—COPPER NOSE.

SYNONYMS.—Varus; gutta rosea.

VARIETIES.—Acne simplex; acne indurata; acne rosacea; acne punctata; acne sebacea.

SYMPTOMS.—This disease attacks the sebaceous follicles of the skin, in the form of isolated pustules, seated on a hard, red base, and terminating in indolent chronic tumours. Its primary form is, in most

* ℥i. = 100 grains.

cases, a hard, red pimple. It is most commonly seen on the nose, cheeks, temples, and forehead, but frequently appears on the back and upper part of the chest, and sometimes on the neck and shoulders. It may exist in all these situations in the same person. It is a chronic disorder, not accompanied by constitutional symptoms; is most frequent from puberty to the age of thirty-five; and occurs in both sexes.

Acne simplex answers to the foregoing description, its most common situation being the shoulders and upper part of the chest; but it also occurs on the face. *Acne indurata* consists in the formation of large indurated tumours by the union of several of the smaller follicles. Its most common seat is the face, but it often occupies the back of the trunk. *Acne rosacea* is generally met with in old persons, and its common seat is the nose and cheeks. As the name implies, the disease is attended with a rosy colour of the skin, which, however, is not permanent, but changes at length to a violet tint. In extreme cases, the superficial veins enlarge, and the cellular tissue, to some depth, becomes inflamed and hardened (*acne indurata*). *Acne punctata* derives its name from a small black point, which forms on the summit of each pimple. *Acne sebacea* is named from the smooth waxy appearance which the eruption sometimes assumes.

DIAGNOSIS.—By the small-sized pustule situated on the hardened base; and by the situation of the disease.

PROGNOSIS.—In *acne simplex*, favourable. It often disappears of itself with the advance of age. *Acne indurata* and *acne rosacea* are often very obstinate, and defy all modes of treatment.

CAUSES.—Hereditary predisposition; dyspepsia; excess in eating and drinking; uterine disorders; change of life; the application of irritating substances to the skin of the face.

TREATMENT.—In young and vigorous subjects, when the disease is recent, a restricted diet, and the avoidance of all stimulating liquors; gentle aperients; spirit lotions, or lotions of the acetate of lead. In chronic cases, and in *acne indurata*, the same general treatment, varied according to the constitution and state of the patient. The local treatment will consist of frictions, with an ointment of iodide of sulphur (gr. xx. of the iodide to an ounce of lard), or a paste of sulphur and milk. Dilute acids or the nitrate of silver cautiously applied to the eruption, or a lotion of two grains of the cyanide of mercury to an ounce of distilled water, are also beneficial. This lotion should be applied with a camel's-hair pencil, and, after a short interval, washed off with cold water. A course of alterative medicines may be given at the same time. A drop of creasote in a mucilaginous draught may also be given with advantage two or three times a day. *Acne rosacea* requires a very careful regulation of the diet, proper exercise, abstinence from stimulating liquors, avoidance of heated apartments, hot fires, and mental excitement, together with the local application of the vapour douche, or the lotion of cyanide of mercury. In very obstinate cases of acne, blisters have sometimes been applied with advantage.

ORDER V.

PAPULÆ—PIMPLES.

LICHEN.

PRURIGO.

LICHEN.

SYNONYMS.—Papulæ siccæ ; scabies sicca vel agria.

VARIETIES.—Lichen simplex ; lichen strophulus ; lichen urticatus ; lichen agrius ; lichen syphiliticus.

SYMPTOMS.—An eruption of small, hard pimples, sometimes of the colour of the skin, sometimes red, generally arranged in patches or clusters, and accompanied by severe itching. Its most common situations are the hands, forearms, neck, and face, but it may attack other parts of the body. It is generally a chronic disorder, but sometimes assumes an acute form. Its usual termination is in desquamation.

Lichen simplex answers to the foregoing description. *Lichen strophulus*, commonly known as *red gum*, *white gum*, or *tooth-rash*, attacks children at the breast, or during dentition, is an acute affection, and generally continues for three or four weeks. It has received many names, according to the arrangement of the pimples, and the colour of the skin. *Lichen urticatus* is characterised by the large size of the papulæ, and their close resemblance to the sting of nettles. In *lichen agrius*, the papulæ are confluent, and seated on a highly-inflamed base ; the pimples ulcerate and discharge a sero-purulent fluid, which dries into small scabs, and these falling off, are replaced by thin scales. It is accompanied by intense smarting pain. *Lichen syphiliticus* is characterised by the coppery hue of the rash.

CAUSES.—*Predisposing*. The seasons of spring and summer. *Exciting*.—Extreme heat ; irritants applied to the skin ; the handling of dry powders ; abuse of ardent spirits ; grief ; disorders of the stomach and bowels ; and in children, the irritation of teething ; the syphilitic taint.

DIAGNOSIS.—By the papular form of the eruption, the severe itching, and its non-contagious character.

PROGNOSIS.—Lichen is not dangerous, but troublesome, and sometimes difficult of cure.

TREATMENT.—In its acute forms, and especially in severe cases of lichen agrius, low diet, brisk aperients, and the antiphlogistic regimen, and tepid emollient applications. Chronic cases require stimulating applications ; such as a wash of carbonate of potash, ointments of iodide and biniodide of mercury (℞s*— $\frac{3}{4}$ i. of lard), and sulphur and iodine vapour. In obstinate cases, Fowler's solution may be necessary.

*℞i. = 100 grains.

PRURIGO—PRURITUS.

VARIETIES.—Prurigo mitis ; prurigo formicans ; pruritus senilis.

SYMPTOMS.—A chronic disease, in which the papulæ are of the colour of the skin, larger than those of lichen, and accompanied by intolerable itching. It may occur on any part of the body, but is most common on the neck and shoulders. In some instances it attacks the external parts of generation in both sexes, or the verge of the rectum. The papulæ are apt to be torn by friction, and to present on their summit a minute clot of blood, which gives to the rash a very characteristic appearance.

Prurigo mitis presents a smaller-sized pimple than the *prurigo formicans*, and is attended with less itching. In the latter disease, the itching is greatly increased by the warmth of bed. *Prurigo senilis* is accompanied by great dryness of the skin.

CAUSES.—*Predisposing*. Childhood and old age, and the seasons of spring and summer. *Exciting*.—All causes of debility, and cachexia ; want of cleanliness ; unwholesome food, privation, friction, irritation of the skin or of the mucous membranes.

DIAGNOSIS.—From *lichen*, by the larger size of the pimples, by the dark spot on their surface, and by the more severe itching.

PROGNOSIS.—Very difficult of cure, especially in aged persons.

TREATMENT.—In prurigo mitis and formicans, tepid baths, gentle aperients, with antimonials ; and in severe cases, an antiphlogistic regimen. In pruritus senilis, the sulphur ointment, the sulphur bath, or the mixed vapours of iodine and sulphur.

ORDER VI.

SQUAMÆ.—SCALES.

LEPRA VULGARIS	Scaly Leprosy.
PSORIASIS	Dry Tetter.
PELLAGRA	Italian Leprosy.
PITYRIASIS	Dandriff
ICHTHYOSIS	Fish-skin.

LEPRA VULGARIS—SCALY LEPROSY.

SYNONYMS.—Kushta of the Hindoos ; Baras of the Arabs.

VARIETIES.—Lepra alphoides ; lepra nigricans.

Lepra and psoriasis are considered separately for the sake of convenience ; but it must be borne in mind that there is no essential difference between them.

SYMPTOMS.—The eruption begins in the form of small round shining spots, slightly raised above the skin, and becoming soon covered with a thin white scale, which, falling off, leaves the surface of the skin red and slightly crusted. The spot increases in size, still retaining its circular form, and is covered by a thicker scale, raised at the circumference, and depressed towards the centre, and of a peculiar shining, silvery appearance. These patches vary in size, from that of a shilling to that of a five-shilling piece. Their most common situation is the neighbourhood of the large joints, especially the knees and elbows, but they may appear on any part of the body, with the exception generally of the face and hands. The spots are often arranged symmetrically on the upper and lower extremities. In cases of long standing, several of the original spots coalesce, and form large scaly patches of a very irregular shape, and the sensibility of the skin is destroyed.

Lepra alphoides is characterised by the small size of the patches, and the silvery appearance of the scales which cover them. *Lepra nigricans* is a rare disease, distinguished chiefly by its darker colour.

CAUSES.—*Predisposing.* The season of autumn; male sex; adult age. *Exciting.*—Most probably syphilis.

DIAGNOSIS.—From *syphilitic lepra*, by the absence of the copper or violet colour, and the greater thickness of the scales. From *favus*, *impetigo*, and *eczema*, by the total absence of moisture, and by its *scaly* nature. The pustular and vesicular diseases produce *scabs*. From *psoriasis*, by the more regular shape of the patches.

PROGNOSIS.—The disease is essentially chronic, obstinate, and difficult of cure, and disappears and returns without obvious cause.

TREATMENT.—This is chiefly local, consisting in the application of the tar ointment, or of the iodide of sulphur ointment, and of sulphur and salt-water baths; and if the disease resist this treatment, preparations of arsenic, or tincture of cantharides internally. The iodide of arsenic (the tenth of a grain three times a day), and the vapour of sulphur and iodine applied by means of a tin box or jar. (Dr. Burgess.) The constitutional treatment must depend on the existing state of health.

PSORIASIS—DRY TETTER.

VARIETIES.—*Psoriasis guttata*; *psoriasis diffusa*; *psoriasis inveterata*; *psoriasis gyrata*.

SYMPTOMS.—A chronic affliction of the skin, consisting of irregular patches, often of considerable size, slightly raised above the surface, fissured, and covered with a white scale. There is some degree of itching, especially at night, but no marked constitutional disturbance. It attacks the eyelids, lips, prepuce, scrotum, backs and palms of the

hands, and nails, and in some of these situations has received distinct names. *Psoriasis palmaris* (grocers' and bakers' itch) and *Psoriasis dorsalis* (affecting washerwomen) are common varieties.

Psoriasis guttata generally attacks adults in the form of small, round, red patches, often combined with the other forms. *Psoriasis diffusa* is more irregular in shape and size. The patches are often of considerable extent, marked by large fissures, and commonly situated on the limbs. *Psoriasis inveterata* is a very severe form of the disease, and generally occurs in old persons, and in debilitated habits. The skin, in the progress of the disease, becomes hard, thickened, and covered with a shining scale, which, when removed, leaves a red, fissured, painful, and bleeding surface. *Psoriasis gyrata* occurs in spiral-shaped stripes, generally on the back. It is very rare.

CAUSES.—*Predisposing*. Hereditary predisposition; adult age; spring and autumn; serofula. *Exciting*.—Abuse of spirituous liquors; unwholesome food; handling of dry powders. It is not contagious.

DIAGNOSIS.—From *eczema*, by the absence of vesicles and moisture, and the larger size and greater thickness of the scabs; from *lichen agrius*, by the absence of papulæ in the early stage.

PROGNOSIS.—A very obstinate and intractable disease, especially in old and weakly persons.

TREATMENT.—After a short course of mild aperients, and strict regulation of diet, with emollient fomentations, alterative medicines, such as a Plummer's pill, or a pill containing the fifth of a grain of the biniodide of mercury, with the external application of the iodide of sulphur ointment, or of the mixed vapour of iodine and sulphur. In bad cases of *psoriasis inveterata*, preparations of arsenic, iodine, mercury, or phosphorus. Donovan's solution of arsenic, iodine, and mercury, is a valuable combination of the first three substances. (In *psoriasis inveterata* attacking delicate anæmic females, *Liquoris Arsenicalis* ℥v., *Tr. Ferri perchloridi* ℥xx., *Infus. Quassiae*, ʒi. is a good combination. The itching and smarting are sometimes greatly relieved by a lotion consisting of ten grains of cyanide of potassium in six ounces of almond emulsion.) (G.)

PELLAGRA—ITALIAN LEPROSY.

SYMPTOMS.—This disease is allied to *psoriasis*. It sets in in the spring of the year with dusky-red shining patches on the feet and back of the hands, which gradually spread, become studded with tubercles, and covered with dry scales, intersected, as in *psoriasis*, by cracks and excoriations. The rash is accompanied by slight itching. It subsides and disappears towards autumn, to return the following spring in a more severe form, accompanied by anxiety, depression of spirits, and convulsive seizures. Towards the end of autumn the disease again

subsides, but less completely, and reappears early the following year; and now extends to every part of the surface, the skin being dry, tough, and shrivelled like that of a mummy. Extreme debility, diarrhœa succeeded by dysentery, dropsy, and epilepsy, follow each other, and wear the patient away, or usher in dementia or mania.

CAUSES.—Obscure. Common in Lombardy and the north of Italy.

TREATMENT.—The disease is believed to be incurable. The remedies prescribed for psoriasis should be persevered with.

PITYRIASIS—DANDRIF.

DEFINITION.—Non-contagious desquamation of the cuticle.

SYMPTOMS.—The disease consists in an abundant desquamation of branny scales, which are constantly renewed. Its most common seat is the scalp, but it attacks other parts of the body. There is itching of the skin, slight in some cases, severe in others; but no constitutional disturbance.

Pityriasis capitis occurs at all ages, and often in new-born infants. It is attended by slight itching, and friction detaches numerous white branny scales. *Pityriasis nigra*, as the name implies, is characterised by the black colour of the skin.

CAUSES.—*Predisposing*. Youth and old age; female sex; debility. *Exciting*.—Irritation of the skin by heat, by the strong rays of the sun, or by chemical or mechanical irritants.

DIAGNOSIS.—Distinguished from the contagious diseases by the absence of fungi.

PROGNOSIS.—Generally obstinate and difficult of cure.

TREATMENT.—Cleanliness; tepid baths; and tonic and alterative medicines. Alkaline and lead lotions, the zinc or lead ointments, the ointment of nitrate of mercury, and sulphurous baths. The itching may be allayed by lotions containing prussic acid.

ICTHYOSIS—FISH SKIN.

SYMPTOMS.—The whole body, or certain parts only, especially the palms of the hands, soles of the feet, face, eyelids, outer surface of the limbs, and the joints, are covered by a number of small, hard, thick, dry, dark-brown rhomboidal scales, produced by the natural flexures of the skin, and resembling somewhat the scales of a fish. The rash often has a very disagreeable odour, and is not accompanied by inflammation, pain, or itching of the skin.

CAUSES.—Obscure; hereditary predisposition. The disease is generally congenital.

DIAGNOSIS.—By the foregoing characters.

PROGNOSIS.—Not attended with danger; but when hereditary, incurable; and when not hereditary, very obstinate.

TREATMENT.—The local treatment most likely to be of service is the vapour bath, followed by the mixed vapours of sulphur and iodine. The internal remedies indicated are arsenic, or some of its combinations, of which the best is the iodide of arsenic.

ORDER VII.

TUBERCULÆ.

LEPRA TUBERCULOSA . . .	Elephantiasis.
FRAMBESIA	The Yaws.
MOLLUSCUM	Molluscum.
CHELOIDEA	Keloid.
MALUM ALEPPORUM.	

LEPRA TUBERCULOSA—ELEPHANTIASIS.

SYNONYMS.—Elephantiasis Græcorum. Lepra Egyptiaca. Lepra Hebræorum.

SYMPTOMS.—The disease commonly sets in with erythematous patches, upon which an eruption of soft, livid tumours, of variable size and irregular shape makes its appearance. The skin and the sub-jacent tissues are hypertrophied and œdematous, and the parts affected ultimately attain an enormous size. The sensibility of the skin is heightened at first, but subsequently diminished. In very severe cases, the tubercles become inflamed and ulcerated, and discharge an offensive sanies, which concretes into black scabs. The adjoining textures, even to the bones, sometimes become implicated, and their structure completely changed. The constitutional symptoms are merely such as result from the prolonged sufferings of the patient. The disease may occur on any part of the body, but it is most common on the lower extremities and face.

CAUSES.—*Predisposing.* Hereditary taint; syphilis; the causes of scrofula; certain climates. Dr. H. V. Carter* has adduced a number of cases which show that there frequently exists a close connection between a varicose state of the lymphatic system and elephantiasis.

PROGNOSIS.—Generally unfavourable.

TREATMENT.—Stimulating applications externally, and arsenical preparations or cantharides internally, in combination with tonic infusions. Change of climate is sometimes beneficial.

* Trans. Med. and Phys. Soc. Bombay, No. vii. 1861, p. 186.

FRAMBÆSIA—THE YAWS.

SYMPTOMS.—The disease sets in, without any marked premonitory symptoms, in the form of clusters, of variable size and shape, of small dark-red spots resembling flea-bites. Upon these spots papulæ are developed, which degenerate into indolent vegetations, firm, slightly inflamed, and covered with thin dry scales, and resembling, when found in circular groups, raspberries or mulberries. In some instances they become the seat of ulceration, and of a yellow or bloody discharge, which concretes into scabs. The surrounding skin is generally indurated.

CAUSES.—*Predisposing.* The climate of the West Indies, and of parts of America and Africa; scrofula. It is very rare among the white population. *Exciting.*—Contagion.

DIAGNOSIS.—By the peculiar appearance of the eruption.

PROGNOSIS.—Generally favourable. It sometimes assumes a chronic form, and continues for years.

TREATMENT.—The local application of stimulating ointments, such as the ointment of arsenic, or of the red nitrate, or yellow iodide of mercury; caustic, or the actual cautery. Internally, tonics and alteratives, and mercurial preparations in small doses; and in chronic cases, the preparations of arsenic. Warm and vapour baths and douches may also be used with advantage.

MOLLUSCUM.

SYMPTOMS.—Numerous indolent tubercles, from the size of a pea to that of a pigeon's egg, of various forms, sessile or pedunculated, of the natural colour of the skin, containing a little sebaceous matter, unaccompanied by any constitutional disorder, and not attended by pain, inflammation, or ulceration. They present a central depression, leading to an orifice, which is closed with a plug of discoloured sebaceous or albuminous matter. After the removal of this, a coarse needle may be passed down the tumour to some distance within the skin.

PATHOLOGY.—Dr. Beale* concludes that the case of molluscum examined by him was due to morbid alteration of the hair follicles. The sebaceous glands, he states, are sometimes atrophied, and the sweat glands pushed aside, but otherwise these organs are healthy.

CAUSES.—Obscure. One form of the disease is contagious.

TREATMENT.—Fowler's solution was administered by Bateman with success. Biett recommends a solution of sulphate of copper.

* Trans. Path. Soc. vol. vi. p. 316.

CHELOIDEA.

SYNONYMS.—Cancroide ; keloide.

SYMPTOMS.—This is a rare disease, appearing as hard, indolent tubercles, varying in dimension from a very few lines to a few inches, generally isolated, but sometimes occurring in groups, with intervals of sound skin between them. They are of an irregular oval, square, or angular shape, of a rose or a red colour, with a depressed centre, and covered with a thin layer of wrinkled cuticle ; and having a remote resemblance to a crab or tortoise—whence the name. The usual situation of these tumours is the space between the mammæ. They are generally chronic, and unattended with danger.

DIAGNOSIS.—By the peculiar appearance above described.

TREATMENT.—The local application of the vapours of sulphur, iodine, or mercury ; of plasters containing iodine, or iodine and opium ; and alkaline baths.

The disease advances very slowly, and is unattended with danger. The tumours rarely ulcerate ; they are generally chronic, but occasionally they disappear spontaneously, leaving a white cicatrix.

MALUM ALEPPORUM.

DEFINITION.—“A tubercular disease of the skin almost unknown in France, but which prevails endemically at Bagdad, in several towns on the banks of the Tigris and Euphrates, and particularly at Aleppo.” —Cazenave.

SYMPTOMS.—The eruption of one or more tubercles varying in size. At first the tubercle is merely a lenticular eminence, which during the next four or five months gradually increases without local or general symptoms. Acute pain now sets in, followed by deep-fissured and irregular ulceration, discharging a thick, ill-conditioned matter. After five or six months, a dry tenacious scab is formed, which dessicates and separates in the course of one or two months, leaving a deep indelible scar. It attacks persons of all ages, sexes, and conditions of life. Dogs are also liable to the disease. Children are attacked about the age of two or three years. At Aleppo, according to M. Guilhon, scarcely a single adult had escaped.

CAUSE.—Attributed at Aleppo to the use of water from a particular stream. Healthy state of the constitution affords no protection. The disease is rarely complicated with scrofula. It is not contagious, neither is it dangerous. There is no specific plan of treatment known.

ORDER VIII.

MACULÆ—SPOTS.

The diseases belonging to this order are of little practical importance. They consist either in change of colour (*colorationes*) or loss of colour (*decolorationes*). To the former belong the common freckle (*lentigo* and *ephelis*), the molt (*spilus*), purpura, petechiæ, bruises, the several forms of *navus*; to the latter, the universal colourless state of the skin (*albinismus*), and the partial absence of colour (*vitiigo*).

OTHER DISEASES OF THE SKIN.

LUPUS—THE WOLF.

SYNONYMS.—Lupus vorax; herpes exedens; formica corrosiva.

VARIETIES.—Superficial, deep-seated, and tubercular lupus.

SYMPTOMS.—This disease, in all its forms, is characterised by its tendency towards destructive ulceration of the parts which it attacks. Its most common point of attack is the nose; but it may occur on other parts of the face, but very rarely on the trunk or extremities.

The *superficial* form of lupus is sometimes confined to the skin, from which the cuticle exfoliates, and leaves the true skin red, shining, and tender to the touch, and bearing a close resemblance to the recent scar of a superficial burn. The redness disappears on pressure. When the disease is arrested, it leaves the skin thin and shining, and as if seared by a hot iron.

The *deep-seated* form of the disease generally attacks the alæ of the nose, and is often preceded by redness, swelling, pain, and mucous discharge from the nostrils. The skin first swells and assumes a violet-red colour. After an interval, a small ulcer forms, covered by a scab, beneath which a gradual destruction of the part takes place, first of the skin, and then of the cartilages of the nose. In extreme cases, the whole nose and even the palate and gums are destroyed; but in some instances, the disease lasts for years without occasioning any great amount of destruction.

The *tubercular* form consists in numerous small, soft, red tubercles, which remain stationary for a few weeks, months, or years, till they suddenly become inflamed and enlarged; their bases unite, and their summits ulcerate, forming an irregular-spreading ulcer, covered by a dark tenacious crust. The parts first attacked sometimes partially heal, leaving irregular cicatrices, which become the seat of fresh tubercles and of renewed ulceration. The most common seat of this form is the cheek, but it may occur on the neck and chest, and on the anterior surface of the extremities.

Lupus with hypertrophy is generally confined to the face, and consists in the formation of numerous soft, indolent tumours, which rarely

ulcerate, but enlarge at their bases, and the skin and cellular tissue become hypertrophied. The entire face, in this manner, sometimes attains an enormous size, and is hideously disfigured.

These forms may exist together, leading to the destruction of the nose, eyelids, and lips, and producing very great deformity. They are rarely accompanied by any marked constitutional symptoms.

CAUSES.—*Predisposing.* The periods of childhood and youth; less frequently the adult age up to 40; the female sex; the scrofulous diathesis. *Exciting.*—Obscure. It is not contagious.

DIAGNOSIS.—From *acne*, by the absence of pustules. From *tubercular lepra*, by the insensibility of the skin, and the peculiar fawn colour of the tubercles in this latter disease. From *cancer* by the latter beginning in a single point, surrounded by a hard, circumscribed base, and accompanied by severe darting pains; the ulcers presenting a fungous appearance. From *syphilis*, by the peculiar copper tinge of the syphilitic eruption, and the coexistence of other secondary symptoms. From *impetigo*, by the dark-brown, thick, and adherent crusts; those of impetigo being yellow, rough, and loosely attached.

PROGNOSIS.—*Favourable*, when recent and limited. *Unfavourable*, when of long continuance and extensive.

TREATMENT.—This must be chiefly local, and will consist, where the ulceration has not set in, of friction with stimulating ointments containing the iodides of sulphur, mercury, or ammonium. When ulceration has set in, caustics must be used, such as nitrate of silver, caustic potash, the chlorides of antimony or zinc, the nitrates or iodides of mercury, and the preparations of arsenic; the animal oil of Dippel has also been recommended. The best applications are powders containing arsenic (one or two grains of arsenious acid to an ounce of calomel, to be applied in small quantity to a limited surface of the skin, Dupuytren); or (arsenious acid ten grains, sulphuret of mercury two scruples, animal charcoal ten grains, to be used with caution, and applied to a small surface at a time, Frère Côme); or (a strong solution of cyanide of mercury, 3 or 4 grains to an ounce of water, Burgess); or (a lotion containing one part of chloride of zinc to four of water, Dr. Byron).

FARUNCULUS—BOIL.

SYMPTOMS.—Boils consist of hard circumscribed dark-red tumours of the cellular membrane, accompanied by troublesome itching and smarting, sometimes terminating in resolution, but more frequently passing on into suppuration and the slow discharge of matter by a single small orifice, or by several small openings. Several of these boils follow each other in quick succession, and may continue to harass the patient for weeks together. Their most common situations are the neck,

back, and nates. They are attended with slight constitutional disturbance.

Carbuncles are boils of larger size and more marked character, and are attended by extensive sloughing of the cellular membrane.

CAUSES.—*Predisposing.* Debility, cachexia, and old age. *Exciting.*—Obscure. Boils and carbuncles have been greatly on the increase of late years; and the mortality from carbuncles in the metropolis has risen from 1, 2, 3, or 4 per million, per annum, from 1840 to 1846, to from 7 to 36 per million, per annum, in the interval from 1847 to 1854.

DIAGNOSIS.—From *phlegmon*, by the slow progress and subacute character of the inflammation, and the scanty formation and incomplete discharge of matter. Carbuncles are characterised by the extent of the sloughs.

PROGNOSIS.—Boils are often tedious, but rarely fatal. Carbuncle, especially in aged persons, is often attended with great danger.

TREATMENT.—In mild cases, saline aperients to keep up a free action of the bowels, and poultices to the boils, when inflamed and painful. In more severe cases, the boils to be freely incised and then poulticed. In carbuncle, free crucial incisions, followed by poultices, and a generous diet, with wine and stimulants. In lingering cases, a course of alterative medicines (*Pilula Calomelanos* c. gr. v. bis vel ter die), or alkalies, such as *liquor Potassæ* (*Liq. Potassæ Mxx.*, *Infus. Calumbæ*, ζ ss. ter die), or the Bicarbonate of potash in scruple doses. In most cases of carbuncle we may give bark and ammonia at the outset. Subsequently quinine and acids are required.

The affections of the skin which characterise secondary syphilis have been briefly described under Syphilis, page 653.

CHAPTER IX.

PARASITIC ANIMALS.

1. Intestinal Worms.
2. Other Parasitic Animals.

INTESTINAL WORMS.

- | | |
|----------------------------------|-------------------|
| 1. ASCARIS LUMBRICOIDES | Round Worm. |
| 2. ASCARIS VERMICULARIS | Thread-worm. |
| 3. TRICHOCEPHALUS DISPAR | Long Thread-worm. |
| 4. TRICHINA SPIRALIS. | |
| 5. TÆNIA | Tape-worm. |
| 6. BOTHRIOCEPHALUS LATUS | Broad Tape-worm. |

ASCARIS LUMBRICOIDES—ROUND WORM.

SYNONYM.—Lumbricus.

SYMPTOMS.—These vary with the part of the alimentary canal occupied by the worm, and with the number of the worms, which is generally considerable, though there is sometimes only one. The symptoms commonly present are an uneasy sensation in the abdomen, sometimes amounting to actual pain, which is often described as a biting or gnawing pain; hardness and swelling of the belly; an irregular state of bowels, with scanty evacuations of mucus, sometimes tinged with blood; tenesmus, and, in some cases, dysuria; a variable and sometimes excessive appetite; fœtid breath, and furred tongue. There is also a sensation of itching at the nose and anus, which leads the patient to scratch and pick those parts. The patient also grinds his teeth in his sleep. Increased flow of saliva and bleeding from the nostrils are among the occasional symptoms. The constitutional symptoms are those of infantile remittent fever (see p. 368), with a more marked degree of nervous affection. In young children convulsions are often traceable to this cause. It has also given rise to chorea, headache, giddiness, disordered vision; to dry cough and spasmodic asthma; to violent palpitations, and severe hysterical symptoms. In some instances the general health does not suffer in any appreciable degree.

DIAGNOSIS.—There is no certain sign of the presence of these worms in the intestinal canal until they are discovered in the motions, either with or without the operation of medicines. In some cases they have been discharged from the stomach by vomiting. They

Fig. 89.



occasionally find their way into the gall bladder and bile ducts, and may give rise to abscess of the liver. Their common habitat is the small intestines. They vary from half a foot to a foot in length. The annexed woodcut shows this worm of the usual size and proportion; the head, *a*, is magnified about fourfold. The head is terminated by three papillæ, which can be spread out into a broad circular sucker during the act of sucking.

The posterior extremity of the female (fig. 89) is comparatively slender and pointed. The corresponding part of the male is bent round like a hook.

The fecundity of this entozoon is prodigious. Dr. Eschricht calculates that the body of the mature female contains at a given time as many as 64 millions of eggs.

PROGNOSIS.—These worms when once proved to exist may generally be removed by appropriate remedies.

CAUSES. — *Predisposing.* Childhood and youth. A cachectic state of constitution.

Exciting.—It is probable that the ova are introduced into the alimentary canal with unripe fruit and vegetables, or with impure water.

TREATMENT.—The parasite is readily expelled by irritant purgatives. Of these

With the exception of occasional headaches I
have been for some time past in almost
perfect health, appetite good though
the amount of food taken was not
very great, & the only symptom of gastric
disturbance being a liability to gaseous
eructations after dinner & occasional
pain in the abdomen on awaking in the
morning & ascribed to flatulence
these headaches were most severe in the
left temple but extended to the occiput fore-
head, the left temple being nearly free from pain.
Both eyeballs were ^{pained &} tender on pressure.
The pain was relieved by press for
few seconds by pressure on the
left carotid, finally bending head back
or venous stoppage. Also by pressure
on the upper & outer orbital margins
They generally came on from half an



the Pulvis scammonii compositus is the best. It may be given alone or in combination with a few grains of calomel. Santonica (the flower-buds of several undetermined species of *Artemisia*), or better, its crystallizable bitter principle, sautonine, is a specific against this entozoon. Santonine is not itself purgative, and therefore it may be given to the most delicate children. The dose varies from gr. i. to gr. vi. It may be given at bedtime, and generally should be followed by a purge such as gr. x. to gr. xv. of Pulvis scammonii compositus, or the purgative may conveniently be combined with the anthelmintic. If the introduction of these remedies into the mouth be contra-indicated, enemata of strong infusions of wormwood, rue, tansy, or sautonica, may be administered.

Cowhage (the hairs of the pod of *Dolichos pruriens*) may be given as a mechanical remedy. It should be made into a smooth electuary with treacle, and given in doses of one or two teaspoonfuls for two or three nights in succession, its use being preceded and followed by an aperient.

ASCARIS VERMICULARIS—THREAD-WORM.

SYNONYMS.—*Oxyuris vermicularis*. *Ascarides*. Maw-worm.

SYMPTOMS.—As this worm chiefly infests the large intestines, and especially the rectum, and in considerable numbers, there is an unusual amount of irritation at the verge of the anus. In consequence of the small size of the worms, they are not only contained in the evacuations, but crawl out of the rectum, so as to be found in the clothes or in the bed of the patient, and in females they find their way into the vagina, and cause irritation there. In adult males, they are among the causes of spermatorrhœa. The constitutional symptoms are those described above. (See *Ascaris lumbricoides*.)

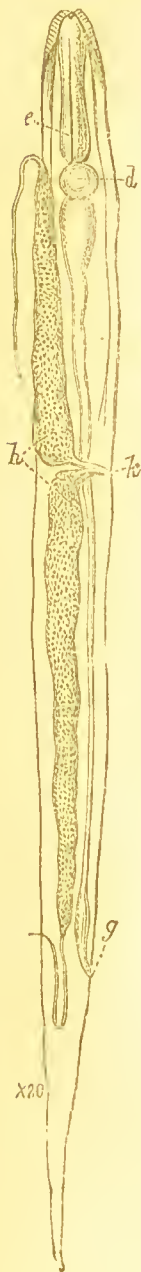
DIAGNOSIS.—The only certain proof of the existence of these worms is the discovery of them in the evacuations, or on the person of the patient. Fig. 91 represents the female eight times the natural size. Fig. 90 still more highly magnified; *d*, stomach; *e*, œsophagus; *g*, anus; *h*, ovaries; *k*, oviduct. They are often found massed together into round balls of considerable size. The male is disproportionately small, both extremities are rounded and obtuse, and it has a pale silver-grey colour. The females are much more numerous and are distinguished by their thickness and whiteness and by the fine pointed tail.

MODE OF INTRODUCTION.—Nothing is certainly known respecting the habitat of the parasite out of the body. It is conjectured that it obtains admission into the intestines in the embryonic condition, being conveyed by salads and unripe fruits.

PROGNOSIS. — These worms are easily expelled by remedies; but in consequence of their large numbers and rapid production, it is not easy to insure their complete expulsion. New broods are also frequently developed.

Fig. 90.

Fig. 91.



TREATMENT. — As the usual seat of these worms is the rectum, injections are the most appropriate remedies. ζ iv. to ζ vi. Liquoris calcis, or the same quantity of Infusum anthemidis or Infusum quassia, thrown into the rectum, are efficacious remedies. They are, however, discharged in considerable numbers by the use of aperients. In children, a combination of equal parts of calomel and jalap, in a dose proportioned to the age, and in adults five grains of calomel and five grains of colocynth, followed in either case by a full dose of castor-oil, is a suitable form of aperient.

TRICHOCEPHALUS DISPAR.

SYNONYMS. — Trichuris, or Long Thread-Worm, is a species of thread-worm commonly found in the cæcum and colon. It is distinguished from the common thread-worm by its greater length, and by the extreme tenuity of the anterior two-thirds, and the increased size of the posterior third of the body. Also, in the case of the male, by the peculiar form of

Fig. 92.

Fig. 93.



the spiculum and sheath, shown greatly magnified at *b* (Fig. 92). The posterior part of the body is commonly found coiled up as in Fig. 93, which shows the worm of its natural size. These little worms vary from an inch and a half to two inches in length. The males are shorter and more slender than the females. The eggs are oval. The parasite has been observed in Egypt, Ethiopia, France, and in England. In this country it is con-

sidered to be of rare occurrence, but in France it is very common. According to M. Duvaine, not less than one-half the inhabitants of Paris are affected by this entozoon.

The treatment is that of the common thread-worm; but injections are less necessary.

TRICHINA SPIRALIS.

Attention has been directed of late to a train of symptoms associated with the development of this parasite in the system, which are stated to be directly due to its presence. The following are the symptoms of the *trichinatus disease*, or trichinosis, as it has been termed.

SYMPTOMS.—Extreme lassitude and depression; sleeplessness and loss of appetite; pyrexia, accompanied by severe muscular pains, and occasionally cedema of the joints, followed sometimes by painful and persistent contractions of the flexor muscles of the extremities. In many cases the disease sets in with diarrhoea. It usually terminates in pneumonia. In some cases typhous symptoms come on and the patient dies in an unconscious condition. The disease, when fatal, runs its course within a month from the date of the introduction of the parasite.

MORBID ANATOMY.—Muscles, pale reddish grey, speckled with minute lighter coloured points, which, on minute examination, prove to be Trichinæ in all stages of development, lying free upon and within the sheaths of the muscular fibres. They pervade all the voluntary muscles, and have been observed in the substance of the heart.

SOURCE OF THE PARASITE.—Pigs in Germany are infested with Trichinæ, and their propagation within the human body is secured by the ingestion of raw or imperfectly cooked pork or sausages. The domestic animals are readily infected by the same means. W. Müller, M.D., of Homburg, states in the 'Lancet,' of Jan. 23, 1864, p. 93, that an epidemic of trichinatus disease occurred in Hettstaedt, in Prussia, from eating imperfectly cooked sausages made of pork infected with the parasite. At one time eighty out of a population of about 5500 were afflicted with the disease, and eighteen or twenty had previously died of it.

The Trichinæ commence their development almost immediately after their introduction into the stomach, males, females, and innumerable embryos being produced within the intestinal canal, whence, by means that have not been ascertained, the latter make their way to their favourite habitat, the muscles, and produce the violent symptoms above mentioned, until they become enclosed within capsules, in which state they are harmless. Fig. 94 represents the animal incapsulated amongst the muscular fibres. Fig. 95 the free mature animal.

Man is infested with this parasite much more frequently than was lately supposed. Dr. Zenker, of Dresden, found Trichinæ in four out of 136 dissections.

The non-encysted animals are not visible to the naked eye. The encysted also, unless they have undergone cretaceous degeneration, require the aid of a pocket lens for their detection.

Fig. 94.

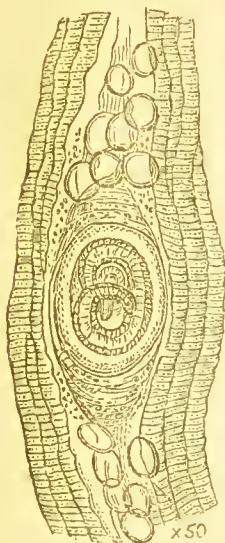
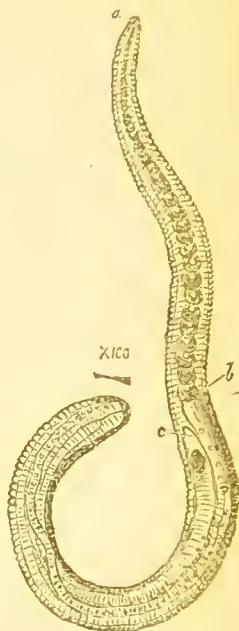


Fig. 95.



TREATMENT.—Since the parasite is carried into the most distant parts of the body with astonishing rapidity, no remedy can be of any avail unless it obtain like *santonine*, a speedy admission into the blood.

TÆNIA SOLIUM—COMMON TAPE-WORM.

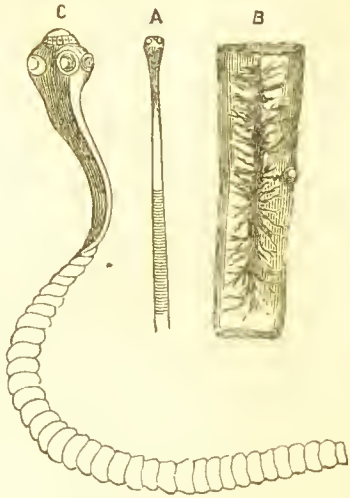
SYNONYM.—Long tape-worm.

SYMPTOMS.—Those already described as caused by *Ascaris lumbricoides*. The tape-worm occupies the whole track of the intestines, but chiefly the ileum. Joints of the worm (B, fig. 96) frequently pass from the bowels, even without medicine, or they escape as the patient moves about.

DIAGNOSIS.—There are no symptoms by which the tape-worm can

be distinguished from other intestinal worms. Its appearance is quite characteristic, and the joints, when expelled from the bowels, may be readily recognised. The worms vary in length from four to twenty feet, and sometimes occupy the whole length of the intestinal canal. The annexed engraving shows (A) the anterior extremity of the animal of the natural size; (C) the same part magnified about four times, showing the circle of hooklets by which the animal attaches itself to the mucous membrane, and three of the four circular suckers which are situated around the head (*scolex*); and (B) a ripe segment from the posterior extremity of the mature parasite. Each of these ripe segments (*proglottis*) represents the adult and independent form of the sexual animal, and contains independent male and female generative organs; the branched organ in the centre is the ovisac containing thousands of ripe spherical eggs.

Fig. 96.



PROGNOSIS.—It is easy to remove considerable portions of the worm by various remedies. The entire worm is less frequently expelled. Search should always be made for the head. Until this is expelled, the patient is not effectually relieved; but when any number of the small joints at the upper end of the worm are expelled, there is a probability in favour of the head having also been removed.

SOURCE OF THE PARASITE.—Chiefly measly pork. Professor Siebold fed animals with *Cysticercus pisiformis* (a very common inhabitant of the liver and peritoneum of hares and rabbits), *C. tenuicollis* (found in the viscera of cattle generally), and *C. cellulosa* (infesting the flesh of the pig, and constituting the “measles”), and also with *Cœnurus cerebralis* (infesting the brain of the sheep), and tape-worms of an ell long were soon produced, which perfectly agreed with both the tape-worm of the dog and with the tape-worm of man, and, therefore, Siebold regards all these cystic worms as only the degenerated embryos and scolices of the tape-worm, and as he cannot detect any specific difference between the tape-worm of the dog (*Tænia serrata*), and that of man (*T. solium*), he concludes that they are all restricted or modified developments of a single species. As a converse experiment, Dr. Haubner, of Dresden, fed lambs with the ripe joints of the tape-worm of the sheep-dog, and thirteen days afterwards “the staggers” (the disease due to the development of the parasite in the brain, under the form of *Cœnurus*) manifested themselves. Some

were killed, and the whole animal (heart, lungs, muscles, brain, &c.,) was found permeated by the encysted young of the parasite. Later dissections of the other animals showed fewer but larger cysts in the brain, the rest, including those of the other parts, being abortive, were dead and absorbed. After four weeks from the commencement of the symptoms the cysts had separate heads with distinct suckers. Fig. 97 represents a portion of the vesicle of *Cœnurus cerebralis* from the calf with an attached colony of involuted scolices.* Magnified scolices are represented in fig. 71 a, p. 610.

Fig. 97.



PROPHYLAXIS.—As a means of prophylaxis, therefore, sheep-dogs should not be allowed to be associated with the flock until they are free from

tape-worm, and in order to prevent the development of the parasite in the human body, all animal diet should be perfectly cooked, so that the meat, when brought to the table, should be firm, and destitute of tremulousness and blood colour. Pork and sheep's brains, in particular, should be completely cooked. The pernicious habit of eating imperfectly cooked meat doubtless results in the propagation of other diseases besides those due to parasites.

TREATMENT.—Oil of turpentine, in the dose of half an ounce followed in two hours by an ounce of castor-oil. This treatment rarely fails of removing the tape-worm, but it is open to the objection that the turpentine acts as a stimulant to the brain and urinary organs, sometimes producing painful strangury. It is much less apt, however, to produce this effect if speedily followed by the castor-oil. Kosso, in the form of infusion (℥ss. ʒi. to Oss. of water), taken at a single dose. This is an extremely effective remedy. The liquid extract of the male fern-root in the dose of ʒi. or ʒiii. It may be given in capsules. This remedy never fails to expel the parasite.

The Kamela or Rottlera tinctoria in the dose of ℥ss. to ʒi.† in water.

These remedies should be given on an empty stomach. A good way of administering them is to order an ounce of castor-oil to be taken over night, the anthelmintic in the morning, and a second ounce of castor-oil two hours afterwards. No food to be taken while the medicines are being administered.

* Siebold on Tape and Cystic Worms.

† ʒi. = 100 grains.

BOTHRIOCEPHALUS LATUS—BROAD TAPE-WORM.

Fig. 98.

SYNONYM.—*Tænia lata*.

SYMPTOMS.—Those of the *Ascaris lumbricoides* (p. 723). The *Bothriocephalus latus* is very rare in England. It is common in Switzerland and Russia, and occurs in France, in common with the *tænia solium*, which latter is the species found in England.

DIAGNOSIS.—From the common tape-worm by the peculiar shape of the head, which is marked in the direction of its length by two fossæ, and by the shape of the sections, which are much broader than they are long. The head and some of the upper segments are shown in the subjoined engraving, from a specimen in the Museum of King's College.

TREATMENT.—That of the common tape-worm.



OTHER ANIMALS PARASITIC WITHIN MAN.

In addition to the animal parasites particularly treated of in the preceding pages and body of the work generally, the following are occasionally met with:

CESTOIDEA.

Tænia mediocanellata (cucurbitina, grandis, saginata), *acanthotrias*, *flavopuncta*, *marginata*, *nana*, and *elliptica* (*T. canina*), *Bothryoccephalus cordatus*. These parasites inhabit the alimentary canal, but may be carried to any part of the system.

TREMATODA.

Distomum hepaticum, *crassum*, *lanceolatum*, *heterophyes*. These parasites inhabit the portal vein and gall ducts. *Distomum ophthalmobium* has been found in the eye. (?)

NEMATOIDEA.

Ascaris mystax (intestines); *Filaria oculi seu lentis*; *Filaria bronchialis*; *Tetrastomum renale* and *Strongylus gigas* (in the kidney); *Anchylostomum duodenale* (duodenum); *Spiroptera hominis* and *Dactylius aculeatus* (discharged from the bladder).

The treatment of these parasitic animals will be determined by their locality and the symptoms which they occasion. The tape-worms require the same remedies as *T. solium*. The *Ascaris mystax* and *Anchylostomum duodenale*, may be expected to yield to the treatment prescribed under *Ascaris lumbricoides*. Respecting the treatment of parasites which inhabit other parts of the body, see remarks at page 610. When the parasites are known to inhabit the bladder, the injection of bitter infusions may be employed.

CHAPTER X.

POISONS.

THE subject of Poisons is here treated simply as a branch of the Practice of Medicine. For the tests of the several poisons, and the more minute details respecting them, the reader is referred to works on Toxicology, or Forensic Medicine. The antidotes for the principal poisons will be found at the end of the chapter.

1. Irritant Poisons.
2. Narcotic Poisons.
3. Narcotico-Irritant Poisons.

1. IRRITANT POISONS.

DEFINITION.—Poisons which cause inflammation or irritation in the alimentary canal, with or without specific remote effects on other organs of the body.

SYMPTOMS.—After an interval varying from a few seconds to half an hour or more from the swallowing of the poison, vomiting and purging, with pain in the stomach and bowels, increased by pressure; and accompanied by inflammatory fever, or extreme prostration of strength. Pain and constriction of the mouth, throat, and gullet, accompanying or following the act of swallowing; intense thirst; hoarse voice, wheezing respiration, and cough; discharge of blood from the stomach and bowels; tenesmus; strangury, dysuria, or suppression of urine; convulsions and epileptic seizures; and cutaneous eruptions, are symptoms of more or less frequent occurrence, but not present in every instance. The remote constitutional effects, whether common to other severe injuries, or specific, are also subject to great variety.

MORBID APPEARANCES.—Marks of corrosion, inflammation, supuration or gangrene in the stomach and upper part of the alimentary canal, extending, in certain cases, to the gullet, throat, and mouth, and through the whole length of the intestines. Perforation of one or other of these parts. In certain cases, signs of inflammation in the windpipe and lungs; in the peritoneum and pleura; in the rectum and bladder. In certain other cases, peculiar stains or indications of the action of the poison on the mouth, throat, gullet, stomach, and duodenum.

DIAGNOSIS.—*During life*, from English and Asiatic cholera, in many cases of irritant poisoning, by the blood mixed with the evacuations from the stomach and bowels, and in many other cases by the effect of the poison upon the mouth, throat, and gullet. In other instances, again, by the specific remote effects of the poison. (*E. g.* inflamed eyes, gastritis, and rapid pulse, in poisoning by arsenic; salivation in poisoning by the preparations of mercury; jaundice, in poisoning by the preparations of copper; pneumonia, in poisoning by tartar emetic; inflammation of the urinary organs, in poisoning by cantharides; &c.) *After death*, by the traces of acute inflammation, and its consequences in the several portions of the alimentary canal; and in many cases by appearances in the upper part of the canal appropriate to particular irritant poisons.

PROGNOSIS.—Dependent on the nature of the poison, the degree of concentration, the vehicle, the dose, the prompt administration or otherwise of an antidote, the state of the stomach (whether full or empty) when the poison was swallowed, and the age and strength of the patient.

MORTALITY.—The mortality varies, in the case of the several poisons contained in this class, from a large proportion of the cases down to a rarely fatal result.

TREATMENT.—After the administration of an antidote (if any exist), the prompt and complete evacuation of the stomach by the stomach-pump (except in the case of the strong corrosive poisons), or by emetics of common salt, mustard, ipecacuanha, or sulphate of zinc, assisted by large draughts of warm water, and tickling the throat with a feather or with the finger. After the evacuation of the stomach, the free use of milk, gruel, barley-water, and abstinence from all solid food. When inflammation runs high, ice or iced-water; when great tenderness is present, leeches followed by warm fomentations. When the bowels cease to discharge blood, and the patient suffers from tenesmus or constipation, one or two table-spoonfuls of castor-oil, with twenty drops or half a drachm of laudanum, mixed with a small quantity of hot milk. Extreme prostration will require the use of larger doses of laudanum, with wine or brandy. When fever runs high, it may be necessary to draw blood from the arm. Occasional symptoms, and symptoms peculiar to certain poisons only, must be treated in the same manner as the same symptoms due to other causes.

2.—NARCOTIC POISONS.

DEFINITION.—Poisons which act on the brain and spinal marrow, and give rise to symptoms referable to those organs, without exciting any irritation or inflammation of the alimentary canal.

SYMPTOMS.—After an interval, varying from a few seconds to one or two hours from the swallowing of the poison, the patient is seized with giddiness, headache, dimness of vision, singing in the ears, drowsiness passing into stupor, and ending in complete coma, with palsy, convulsions, epileptic fits, or tetanic spasms.

MORBID APPEARANCES.—Often very slight. The brain sometimes healthy; the veins and sinuses sometimes gorged with blood; with serum in the ventricles and at the base. In rare instances extravasation of blood.

DIAGNOSIS.—From the close resemblance of the symptoms of some forms of narcotic poisoning and of apoplexy, no satisfactory diagnostic marks can be laid down for narcotic poisons as a class; and in any case the history of the first appearance and progress of the symptoms will constitute our principal means of distinction.

PROGNOSIS.—This, too, cannot be laid down for the entire class, as the chances of recovery vary very greatly with the particular poison which has been taken.

TREATMENT.—The prompt use of the stomach-pump, and, until that can be procured, the administration of emetics of common salt, mustard, ipecacuanha, or sulphate of zinc. The cold affusion as a shock, especially in the early stage of the poisoning. The patient to be kept awake by walking him up and down, or by flecking his hands and feet with a wet towel. After the complete evacuation of the stomach, strong coffee and tea, and diffusible stimulants, to be freely administered. The bowels to be relieved by full doses of castor-oil. So long as the surface continues cold and livid, the heat to be restored by assiduous frictions, and by warm bottles to the feet and pit of the stomach, or by the hot-air bath. In extreme cases, artificial respiration, and galvanic shocks passed from the spine of the neck to the pit of the stomach. This is the treatment of cases of poisoning by opium. In poisoning by prussic acid, the cold affusion is the first remedy to be employed; and in cases which survive some minutes or hours, heat and assiduous frictions, to restore warmth to the surface, must take the place of the compulsory exercise necessary in poisoning by opium, and by other poisons producing well-marked narcotic effects.

For the treatment of poisoning by chloroform see page 477.

3. NARCOTICO-IRRITANT POISONS.

SYNONYM.—Narcotico-acrids.

DEFINITION.—Poisons which produce the combined effects of the irritant and narcotic poisons; the irritant action being generally less violent than in the case of the pure irritants, and delirium being of more common occurrence than in cases of poisoning by the pure narcotics.

SYMPTOMS.—At an interval varying from about an hour to three or four hours after swallowing the poison (which, in many cases, has a peculiar taste), giddiness, disorders of the senses of sight and hearing, delirium, convulsions, tetanic spasms, stupor passing into coma; preceded or accompanied by vomiting and purging, with pain and tenderness of the abdomen. As a general rule the narcotico-irritants act chiefly or wholly as narcotics in very large doses, and mainly as irritants in small doses.

MORBID APPEARANCES.—Not strongly marked or uniform, consisting of marks of inflammation in the stomach and intestines, with congestion of the brain.

DIAGNOSIS.—From most of the pure irritants by the presence of symptoms of narcotic poisoning. From the pure narcotics by the presence of more or less irritation in the alimentary canal; also in many cases (especially in poisoning by stramonium, belladonna, and hyoscyamus) by the presence of delirium, and in other instances (poisoning by strychnia) by the violent tetanic spasms.

PROGNOSIS.—Dependent chiefly on the early or late commencement of the treatment, and on the circumstances mentioned under the head of Narcotics.

TREATMENT.—The prompt use of the stomach-pump, or of emetics, followed by aperients and enemata, if required. The rest of the treatment to be determined by the symptoms present; if chiefly those of irritant poisoning, the treatment proper to that class of poisons, if chiefly of narcotic poisoning, the treatment prescribed under Narcotic Poisons.

ANTIDOTES TO THE PRINCIPAL POISONS.

ACIDS, MINERAL.—Calcined magnesia or carbonate of magnesia; common chalk, whiting, prepared chalk, or compound chalk powder; a dilute solution of carbonate of soda, or potash; in an emergency, the plaster of an apartment, broken up and diffused through water; soap suds, or oil.

ACIDS, VEGETABLE.—Magnesia, common chalk, whiting, prepared chalk, or compound chalk powder. Carbonate of soda.

ALUM.—Calcined magnesia.

AMMONIA AND ITS CARBONATE.—Vinegar and water, oil.

ANTIMONY, CHLORIDE OF.—Magnesia, carbonate of soda.

ARSENIOUS ACID AND THE SOLUBLE ARSENITES.—No certain antidotes. Hydrated oxide of magnesia; magnesia in a state of fine division; the hydrated sesquioxide of iron; or powdered charcoal may be given. Also, a mixture of oil and lime water.

BARYTA, SOLUBLE SALTS OF.—Sulphate of magnesia or of soda.

BARYTA, CARBONATE OF.—Sulphate of magnesia with weak vinegar.

CHLORINE.—Ammonia; magnesia.

HYDROCYANIC ACID.—After cold affusion, liquor chlorinii, the mixed oxides of iron diffused through water, ammonia, and the treatment of asphyxia.

IODINE.—Starch, very dilute solution of caustic potash or soda.

IRON, SULPHATE OF.—Carbonate of soda or carbonate of ammonia.

LEAD, SOLUBLE SALTS OF.—Sulphate of soda or magnesia.

LEAD, CARBONATE OF.—Sulphate of magnesia with weak vinegar.

LIME.—Vinegar and water.

MERCURY, SOLUBLE SALTS OF.—White of egg; flour and water.

MORPHIA, and the alkaloids generally, finely divided animal charcoal.

MURIATIC ACID.—*See* Acids, Mineral.

NITRIC ACID.—*See* Acids, Mineral.

OPIUM AND ITS PREPARATIONS.—No antidote. Treatment by the stomach-pump or mustard emetics, cold affusion, and forced exercise. Then strong coffee. In extreme cases, electro-magnetism and artificial respiration.

OXALIC ACID AND THE SOLUBLE OXALATES.—Common chalk, whiting, prepared chalk, or compound chalk powder, magnesia.

PHOSPHORUS.—No antidote. Magnesia diffused through water, or suspended in mucilage, may be given with advantage.

POTASH AND ITS CARBONATES.—Vinegar and water; oil.

SILVER, NITRATE OF.—Solution of common salt.

SODA AND ITS CARBONATES.—Vinegar and water; oil.

STRYCHNIA.—Tincture of aconite, opium, tobacco, chloroform.

SULPHURET OF POTASSIUM.—Weak solution of chlorine.

SULPHURIC ACID.—*See* Acids, Mineral.

TARTAR EMETIC.—Tannic acid; tincture of bark, kino, or catechu; decoction of cinchona, or of oak bark; strong tea.

ZINC, SULPHATE OF.—A dilute solution of carbonate of soda.

CLASSIFICATION OF REMEDIES AND FORMULÆ.

EXCEPT when otherwise stated, the medicines prescribed in the following Formulæ are those of the British Pharmacopœia, which has been published since the last edition of this work appeared. As no advantage, but the reverse, can result from changing the terms. Chlorinium and Chlorinatus to Chlorum and Chloratum; and Iodinium to Iodum, the old names are retained. The former compilers of the Pharmacopœia showed their sagacity in avoiding mention of a drug which is sometimes objected to by fanciful or disobedient patients, and we are induced to follow their example in preserving a now obsolete compound, the *pilula styracis composita*, and in retaining the name of *pilula saponis composita*, that we may have some means of administering opium without the knowledge of the patient in exceptional cases.

Both weights and measures are now according to the imperial standard, avordupois weight being substituted for troy weight. Drachm and scruple weights are therefore, pharmaceutically speaking, obsolete. A substitute was necessary, and a new weight, which we propose to call the centum, has been adopted in place of them.

The weights and measures, with their respective symbols, are as follows:—

WEIGHTS.

1 pound	℔	= 16 ounces = 7000 grains.
1 ounce	℥	= 437·5 „
1 centum	℥	= $\frac{1}{70}$ pound = 100 „
1 grain	gr	= 1 „

MEASURES.

1 gallon	· C	= 8 pints . . = Oviii.
1 pint	· O	= 20 fluid ounces = f ℥xx.
1 fluid ounce	f ℥	= 8 drachms . = ℥viii.
1 drachm	℥	= 60 minims . = ℥i lx.
1 minim	· ℥	 = ℥i.

The doses are full doses for Adult Males, unless otherwise stated. For Adult Females they must be somewhat diminished, according to the judgment of the practitioner. In prescribing for younger persons of either sex, the subjoined table of doses may be safely followed. The dose for the Adult Male is taken at 60 grains or 60 minims.

	Gr. or ℥.
Adult male	℥. or 1
14 years	xxx. or $\frac{1}{2}$
7 years.	xx. or $\frac{1}{3}$
5 years	xv. or $\frac{1}{4}$
3 years.	x. or $\frac{1}{6}$
1 year	vi. or $\frac{1}{1}$
6 months	iii. or $\frac{1}{20}$
3 months	ii. or $\frac{1}{30}$

(For the sake of brevity, the prescriptions for mixtures contain, with few exceptions, six ounces, which may be readily converted into draughts of an ounce and a half or an ounce by dividing them into four or six parts. The dose is indicated by the fractions ($\frac{1}{4}$) and ($\frac{1}{6}$). The mixtures or draughts may be given every three, four, or six hours, or three times a day, according to the circumstances of each case. The directions are generally omitted, as involving unnecessary repetition. As no useful purpose is answered by giving the directions for taking medicine in Latin, English has been generally substituted.)

STIMULANTS.

I. GENERAL STIMULANTS.

(Including Diffusible Stimulants and Stimulant Antispasmodics.)

1. Ammoniæ carbonas Dose gr. iii.—gr. x.
2. Liquor ammoniæ „ ℥ x.— $\bar{3}$ ss.
3. Liquor ammoniæ acetatis „ ℥ xv.— $\bar{3}$ i.
4. Spiritus ammoniæ aromaticus „ ℥xx.— $\bar{3}$ i.
5. Spiritus chloroformi „ $\bar{3}$ ss.— $\bar{5}$ ii.
6. Ammoniæ hydrochloras „ gr. x —xxx.
7. Æther (sulphuricus) „ ℥. xx — $\bar{3}$ i.
8. Spiritus ætheris nitrosi „ $\bar{3}$ i.— $\bar{3}$ ss.
9. Spiritus tenuior
10. Oleum anethi, anthemidis, anisi, carui, caryophylli, cinnamomi, juniperi, sabinæ, lavandulæ, terebinthinæ, rorismarini, menthæ (viridis et piperitæ), myristicæ, pimentæ, cajuputi, pulegii, limonum, rutæ } „ ℥ iii.—℥ v.
11. Spiritus camphoræ, cajuputi, armoraciæ compositus, juniperi, menthæ, piperitæ, myristicæ, lavandulæ, and rorismarini . . } „ ℥ xx.—℥ xl.

- | | |
|---|-------------------------------------|
| 12. Tinctura aurantii, assafœtidæ, benzoini, bucco, capsici, cardamomi composita, cascarillæ, castorei, cinchonæ flavæ, cinchonæ composita, cinnamomi, gentianæ composita, guaiaci ammoniata, lavandulæ composita, limonis, lupuli, myrrhæ, serpentariæ, valerianæ, valerianæ ammoniata, and zingiberis | } Dose ʒ ss.—ʒii. |
| 13. Camphora | „ gr. v.—gr. x. |
| 14. Tinctura camphoræ cum opio | „ ℥ xv.—ʒi. |
| 15. Aqua camphoræ | „ f ʒi.—ʒii. |
| 16. Moschus | „ gr. v.—xx. |
| 17. Assafœtida | „ gr. v.—xx. |
| 18. Kreasotum | „ ℥ i.—℥ii. |
| 19. Phosphorus | „ gr. $\frac{1}{8}$ — $\frac{1}{4}$ |
| 20. Liquor sodæ chlorinatæ | „ ℥ x.—ʒi. |
| 21. Liquor calcis chlorinatæ | „ ℥ x.—ʒi. |

The aqua camphoræ, the distilled waters (aqua anethi, carui, fœniculi, cinnamomi, pulegii, pimentæ, menthæ,—viridis and piperitæ—), and the tonic infusions (infusum anthemidis, aurantii, bucco, calumbæ, caryophylli, cascarillæ, cinchonæ flavæ, cuspariæ, gentianæ compositum, chiratæ, krameria, lupuli, quassia, serpentariæ, and valerianæ) are appropriate vehicles for the stronger stimulants, and the syrups (especially the syrupus aurantii and zingiberis) may be used to impart an agreeable flavour.

Stimulants in the form of Mixture and Draught.

- | | |
|--|--|
| 1. R. Ammonia carbonatis gr. xxx.
Liquoris ammonia acetatis ʒiii.
Syrupi aurantii f ʒi.
Aquæ f ʒivss. M. ($\frac{1}{6}$.) | Ammonia carbonatis gr. xl.
Aquæ menthæ piperitæ f ʒvi. M. ($\frac{1}{6}$.) |
| 2. R. Spiritus ammonia aromatici f ʒss.
Tincturæ lavandulæ compositæ f ʒi.
Aquæ cinnamomi f ʒiiiss.
Syrupi aurantii f ʒi. M. ($\frac{1}{4}$.) | 5. R. Spiritus ætheris f ʒiss.
Tincturæ lavandulæ co. f ʒss.
Aquæ camphoræ f ʒvss M. ($\frac{1}{4}$.) |
| 3. R. Tincturæ guaiaci ammoniatæ f ʒss.
Decocti cinchonæ flavæ, f ʒvss. M. ($\frac{1}{6}$.) | 6. R. Spiritus ætheris f ʒi.
Spiritus ammonia aromatici f ʒss.
Spiritus cajeputi ʒii.
Infusi cascarillæ f ʒiv. M. (Dose, $\frac{1}{6}$.) |
| 4. R. Guaiaci pulveris ʒii.* | 7. R. Camphoræ gr. xl.
Spiritus rectificati ℥v. |

* ʒi. = 100 grains.

Reduce to a powder, and add—
 Pulveris acaciæ $\frac{3}{4}$ ss.
 Syrupi limonis f $\frac{3}{4}$ ss.
 Aquæ menthæ viridis
 f $\frac{3}{4}$ v. M. ($\frac{1}{6}$ or $\frac{1}{4}$.)

8. R. Moschi $\mathcal{O}$ ss*
 Pulveris tragacanthæ com-
 positi $\frac{3}{4}$ ss.
 Aquæ cinnamomi f $\frac{3}{4}$ vss.
 M. ($\frac{1}{6}$.)

9. R. Tr. valerianæ ammoniatæ.
 Tincturæ assafœtidæ aa
 f $\frac{3}{4}$ ss.
 Aquæ pimentæ f $\frac{3}{4}$ iii. M. ($\frac{1}{4}$.)

10. R. Tincturæ valerianæ f $\frac{3}{4}$ ss
 Tincturæ lavandulæ comp.
 f $\frac{3}{4}$ jss.
 Infusi valerianæ f $\frac{3}{4}$ iv. M.
 ($\frac{1}{4}$.)

11. R. Râdicis armoraciæ excisæ
 $\frac{3}{4}$ ii.
 Seminis sinapis $\frac{3}{4}$ jss.
 Baccæ juniperi contusæ $\frac{3}{4}$ iii.
 Vini Xerici $\mathcal{O}$ iii.
 (Digest for one week, and strain.
 Dose, a wine-glassful. This is a
 non-official preparation.)

12. R. Olei terebinthinæ f $\frac{3}{4}$ i.
 Ovi vitelli unius.
 Sacchari $\frac{3}{4}$ ss.
 Aquæ $\frac{3}{4}$ iv. M. ($\frac{1}{4}$ — $\frac{1}{6}$.)
 (In chronic rheumatism. The
 whole, mixed with a pint of
 gruel, may be also used as an
 enema in certain cases.)

13. R. Kreasoti $\mathfrak{m}$ vi.
 Misturæ amygdalæ f $\frac{3}{4}$ vi. M.
 (Dose, $\frac{1}{6}$ or $\frac{1}{4}$ in the obstinate
 vomiting of certain stomach
 diseases.)

14. R. Spirit. ætheris nitrosi f $\frac{3}{4}$ i.
 Spiritûs chloroformi f $\frac{3}{4}$ i.
 Syrupi tolutani f $\frac{3}{4}$ iv. M.
 (A Linctus in teasing coughs.
 Dose, a tea-spoonful.)

15. R. Phosphori gr. v.
 Olei olivæ f $\frac{3}{4}$ ss.
 Digest a fortnight in the dark,
 and add—
 Olei carui $\mathfrak{m}$ iv.
 (Dose, 15 drops cautiously in-
 creased, in almond emulsion.
 In impotency and chronic skin
 diseases.)

Stimulants in the form of Pill, Bolus, and Powder.

16. R. Terebinthinæ Cauadensis
 gr. v.
 Pulvis glycyrrhizæ, quan-
 tum sufficit.
 (Make a bolus, or two pills.)

17. R. Camphoræ.
 Moschi aa gr. x. M.
 (The powder to be taken in barley
 water; in hysteria.)

2. STIMULANTS ACTING LOCALLY UPON CERTAIN
 SYSTEMS OR PARTS.

THROUGH THE NERVES ON THE MUSCULAR SYSTEM.

(a) *On the Voluntary Muscle.*

1. Extractum nucis vomicæ . dose gr. $\frac{1}{4}$, gradually increased to gr. ii.
- 2 Strychnia „ gr. $\frac{1}{24}$, cautiously increased to gr. $\frac{1}{8}$.
3. Liquor strychniæ „ $\mathfrak{m}$ v (= $\frac{1}{24}$ gr.) . . . $\mathfrak{m}$ xv. = $\frac{1}{8}$ gr.

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| <p>18. R. Strychniæ gr. i.
Extracti gentianæ ʒss.
(Mix and divide into twenty-four pills.)

<i>In the form of Mixture.</i></p> | <p>Aquæ menthæ piperitæ
f ʒvj. M. ($\frac{1}{6}$ or $\frac{1}{4}$.)</p> |
| <p>19. R. Liquoris strychniæ ʒss.</p> | <p>20. R. Liquoris strychniæ, ʒss.
Quiniæ disulphatis gr. ix.
Acidi hydrochlorici diluti
℥xv.
Aquæ cinnamomi f ʒvi.
(M. $\frac{1}{6}$ to $\frac{1}{4}$.)</p> |

(b) *On the Involuntary Muscle.*

ON THE UTERUS.

Cereale.

1. Extractum ergotæ liquidum; dose, ℥xv. to ʒi.
2. Infusum ergotæ; dose, f ʒiss to ʒiii.
3. Tinctura ergotæ; dose, ʒi. to ʒii.

ON THE URINARY ORGANS.

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| Cantharis vesicatoria. | Dose in powder gr. $\frac{1}{2}$, cautiously increased. |
| Cantharidis tinctura. | „ ℥ x., cautiously increased. |
| Sabinæ tinctura. | „ ℥ xx.—ʒi. |
| Sabinæ oleum. | „ ℥ii.—v. |

In the form of Mixture or Draught.

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| <p>21. R. Tinct. cantharidis ʒi.
Infusi quassiæ f ʒvi. M. ($\frac{1}{6}$.)</p> | <p>23. R. Tinct. cantharidis ʒi.
Tinct. ferri perchloridi ʒii.
Aquæ pimentæ f ʒvi. M. ($\frac{1}{6}$.)</p> |
| <p>22. R. Tincturæ sabinæ ʒiv.
Spiritus myristicæ ʒii.
Infusi Bucco f ʒv. Mix.
($\frac{1}{6}$ to $\frac{1}{4}$.)</p> | <p>24. R. Olei sabinæ guttas xii.
Spiritus chloroformi f ʒss.
Aquæ f ʒvss. M. ($\frac{1}{6}$ to $\frac{1}{4}$.)</p> |

ON THE MUCOUS MEMBRANES.

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| Copaiba | dose ℥xx. to ʒii. |
| Copaibæ oleum | „ ℥v.—℥xx. |
| Pulvis cubebæ | „ gr. xx. to gr. xxx. |
| Cubebæ oleum | „ ℥v.—℥xx. |
| Confectio piperis | „ ʒss. to ʒi.* |
| Balsamum Peruvianum | „ ℥xv.—℥xxx. |
| Confectio terebinthinæ | „ gr. xxx.—ʒss.* |
| Balsamum toltutanum | „ gr. xx. to gr. xxx. |
| Syrupus toltutani | „ ʒi. to ʒss. |
| Tinctura toltutana | „ ʒss.—ʒi. |
| Tinctura benzoini composita | „ ʒss. to ʒii. |
| Oleum terebinthinæ | „ ℥x. to ʒi. |
| Terebinthina Canadensis | „ gr. v. to xx. |

* ʒi. = 100 grains.

In the form of Mixture, Draught, &c.

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| <p>25. R. Copaibæ f ʒss.
Liquoris potassæ ʒi.
Syrupi tolutani ʒss.
Decocti hordei f ʒv. M. ($\frac{1}{6}$.)</p> <p>26. R. Pulvis cubebæ ʒss.
Syrupi papaveris f ʒi.
Pulvis acaciæ ʒss.
Aquæ cinnamomi f ʒiv.
M. ($\frac{1}{4}$ to $\frac{1}{6}$.)</p> | <p>27. R. Confectionis piperis.
———— sennæ.āā ʒi. M.
(A dessert or table-spoonful twice
or thrice a day.)</p> <p>28. R. Tinct. benzoini co. f ʒss.
Syrupi tolutani f ʒii.
Pulv. tragacanth ʒi.*
Aquæ f ʒiiiss. Mix.
(Dose, $\frac{1}{4}$.)</p> |
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In the form of Pill or Powder.

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| <p>29. R. Copaibæ.
Magnesiæ āā ʒss. M.
(Divide into 100 pills, of which
give six four times a day; in
gonorrhœa and bronchitis.)</p> | <p>30. R. Pulveris cubebæ ʒi.
Sodæ bicarbonatis ʒss. M.
(Divide into ten powders; one to
be taken three or four times
a day; in gonorrhœa.)</p> |
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(Copaiba may be administered in capsules composed of a thin layer of gelatine. Turpentine and iodine—a drachm of turpentine, and half a drachm of tincture of iodine to half a pint of hot water—may be inhaled as stimulants to the mucous membrane of the bronchial tubes.)

3. EXTERNAL AND LOCAL STIMULANTS.¹

CAUSTICS.

1. Acidum nitricum; sulphuricum; arseniosum. Zinci chloridum et sulphas.
2. Argenti nitras.
3. Cupri sulphas.
4. Liquor ammoniæ fortior; liquor hydrargyri nitratis acidus.
5. Soda caustica.
6. Potassa caustica.

2. VESICANTS.

1. Emplastrum cantharidis.
2. Linimentum cantharidis.

3. RUBEFACIENTS.

1. Acidum aceticum; hydrochloricum dilutum; nitricum dilutum; nitro-hydrochloricum dilutum; sulphuricum dilutum; sulphurosum.
2. Alcohol; spiritus tenuior.
3. Linimentum ammoniæ; camphoræ; camphoræ compositum; chloroformi; crotonis; hydrargyri; iodinii; saponis; tere-

* ʒi. = 100 grains.

- binthina; terebinthina aceticum. Emplastrum ammoniaci cum hydrargyro; galbani; picis; resina; calefaciens.
4. Liqueur ammoniac; ammoniac fortior; calcis chlorinata; soda chlorinata.
 5. Armoracia radix.
 6. Cantharidis tinctura.
 7. Sinapis cataplasma.
 8. Chlorinii vapor.
 9. Chloroformum.
 10. Kreasotum.
 11. Unguentum antimonii tartarati; calomelanos; hydrargyri iodidi rubri; hydrargyri nitratis; hydrargyri oxidi rubi; hydrargyri ammoniaci; iodinii compositum; kreasoti; potassii iodidi; resina; elemi; cantharidis; sulphuris; terebinthina; sabina.
 12. Spiritus ammoniac aromaticus; cajuputi; camphora; chloroformi; rectificatus; rorismarini.
 13. Oleum cajuputi; caryophylli; crotonis; ruta; rorismarini; sabina; terebinthina.
 14. Tinctura arnica; cantharidis; capsici; iodinii.
 15. Iodinium; sulphuris iodidum.
 16. Phosphorus.
 17. Pix Burgundica; liquida; resina; terebinthina canadensis. Thus Americanum; balsamum Peruvianum; balsamum toluatum.
 18. Pyrethri radix.
 19. Sulphur sublimatum.
 20. Zinci sulphas.

Stimulant Lotions.

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| <p>31. R. Acidi nitrici.
Acidi hydrochlor. aa ℥xx.
Aque f ℥viii. M.
(Lichen and chronic eczema.)</p> <p>32. R. Rosae petalorum gr. xx.
Aque ferventis ℥viii.
Acidi nitrici diluti f ℥iiss. M.
(In the same.)</p> <p>33. R. Kreasoti ℥iv.
Spiritus tenuioris f ℥i. M.
(In rheumatism.)</p> <p>34. R. Calomelanos ℥ss.*
Liquoris calcis f ℥vi. M.
(Black wash.)</p> | <p>35. R. Acidi sulphurici diluti.
Aque destillate aa f ℥ss. M.
(In Favus.)</p> <p>36. R. Potassae causticae ℥ss.*
Aque destillate f ℥iv.
(In the same.)</p> <p>37. R. Acidi sulphurosi.
Aque, partes aequales. M.
(In fungous skin diseases.)</p> <p>38. R. Liq. ammoniac fort. f ℥i.
Spiritus rorismarini f ℥ss.
Tinct. camphora f ℥ii. M.
(A highly-stimulant application.)</p> <p>39. R. Hydrargri bichloridi gr. x.
Liquoris calcis f ℥vi. M.
(Yellow wash.)</p> |
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* ℥l. = 100 grains.

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| 40. R. Zinci sulphatis gr. vi.
Spiritus Rorismarini.
Tincturæ Lavandulæ com- | positæ. āā ʒiss.
Aquæ f ʒvss. M.
(Red wash.) |
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Stimulant Collyria.

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| 41. R. Aluminis gr. v.
Aquæ ʒi. Solve. | 45. R. Hydrarg. bichloridi gr. ¼.
Aquæ destillatæ fʒi. Solve. |
| 42. R. Argenti nitratis gr. i.
Aquæ ʒi. Solve. | 46. R. Potassii iodidi gr. vii.
Iodinii gr. iii.
Aquæ destillatæ Oi. Solve. |
| 43. R. Cupri sulphatis gr. v.
Aquæ ʒi. Solve. | (In scrofulous inflammation of the
eye.) |
| 44. R. Zinci sulphatis gr. ii.
Vini Opii ʒii.
Aquæ ʒi. | |

Stimulant Baths.

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| 47. R. Acidi hydrochlorici ʒii-ʒiv.
Aquæ q. s. M.
(In chronic diseases of the skin.) | 50. R. Iodinii ʒii.
Liquoris potassæ fʒii.
Aquæ calidæ Cxx. M. |
| 48. R. Acidi nitro-hydrochlorici
diluti Oj.
Aquæ tepidæ (96°) q.s. M.
(The acid may be used in the pro-
portion of ʒvi. to 8 gallons, as
a bath or lotion.) | 51. R. Hydrargyri sublimati cor-
rosivi ʒi.*
Acidi hydrochlorici ʒi.
Aquæ Cxxx. Solve. |
| 49. R. Kreasoti ʒii.
Glycerini ʒii.
Aquæ calidæ Cxxx. M. | 52. R. Sulphuris precipitati ʒii.
Sodæ hyposulphitis ʒi.
Acidi sulphurici diluti ʒss.
Aquæ Cxxx. M. |

Stimulant Liniments.

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| 53. R. Liquoris ammoniæ fʒss.
Linimenti saponis f ʒiss. M. | 57. R. Antimonii tartarati ʒss*
Aquæ rosæ f ʒii.
Tincturæ cantharidis fʒi. M. |
| 54. R. Tincturæ cantharidis f ʒss.
Linimenti saponis f ʒiss.
(A good application to chilblains.) | 58. R. Olei crotonis ʒj.
Linimenti saponis ʒi. M. |
| 55. R. Camphoræ ʒi*
Olei terebinthinæ f ʒss.
Linimenti camphoræ f ʒss
M. | 59. R. Acidi sulphurici ʒiss.
Olei terebinthinæ ʒss.
Olei olivæ f ʒiss. M. caute. |
| 56. R. Pulvis seminis sinapis ʒi.*
Acidi acetici fʒss.
Olei terebinthinæ fʒiss. M. | 60. R. Olei cajuputi f ʒiss.
Linimenti camphoræ com-
positi f ʒss. M. |

* ʒi. = 100 grains.

Stimulant Ointments.

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| <p>61. R. Argenti nitratis gr. x.
Unguenti simplicis ℥ss.* M.</p> <p>62. R. Olei crotonis ℥i.
Adipis ℥i. M.</p> <p>63. R. Kreasoti ℥v—xxx.
Adipis ℥ss. M.
(In acne, sycosis, lepra, psoriasis,
ozæna, and ill-conditioned
ulcers.)</p> <p>64. R. Camphoræ gr. xv.
Glycerini ℥ss.
Adipis ℥i. M.
(Scaly skin diseases.)</p> <p>65. R. Camphoræ gr. xx.
Unguenti hydargyri ℥ss. M.</p> <p>66. R. Phosphori gr. ii.—v.
Ætheris q. s.</p> | <p>Dissolve, then add—
Camphoræ gr. xx.
Unguenti simplicis ℥ss. M.
(Lupus, syphilitic tubercle, acne
rosacea.)</p> <p>67. R. Potassæ carbonatis ℥i.
Sulphuris precipitati ℥ii.
Adipis ℥iv. M.</p> <p>68. R. Picis liquidæ ℥iv.
Ceræ flavæ ℥ss.
Sulphuris ℥i. M.
(In favus, impetigo, &c.)</p> <p>69. R. Antimonii tartarati ℥ss.*
Adipis ℥i. M.
(In spinal irritation.)</p> <p>70. R. Cupri sulphatis gr. xxx.
Acidi sulphurici diluti ℥x.
Adipis ℥i. M.</p> |
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Stimulant Poultices.

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| <p>71. R. Sinapis lb.ss.
Aceti calidi q. s. M.
(More stimulating than the cata-
plasma sinapis of the Ph. Br.)</p> | <p>72. R. Lini seminis contriti ℥iv.
Aquæ ferventis f ℥viii.
Mix gradually, and add—
Calcis chlorinatæ ℥i.*</p> |
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Stimulant Gargles.

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| <p>73. R. Tincturæ capsici f ℥ss—f ℥i.
Syrupi simplicis f ℥i.
Aquæ rosæ f ℥vi. M.</p> <p>74. R. Vini rubri Lusitanici f ℥vi.
Tincturæ capsici f ℥ss. M.</p> <p>75. R. Acidi hydrochlorici f ℥ss.
Mellis rosæ ℥i.
Decocti hordei f ℥viss. M.</p> <p>76. R. Acidi nitro-hydrochlorici
℥iii.
Decocti hordei f ℥viss.
Mellis rosæ f ℥i.
(In relaxed sore throat.)</p> | <p>77. R. Infusi rosæ acidi f ℥iiss.
Tincturæ myrrhæ f ℥ss.
Sacchari ℥ss. M.</p> <p>78. R. Mellis boracis ℥iss.
Aquæ f ℥viss. M.</p> <p>79. R. Mucilaginis acaciæ ℥viiss.
Olci tercbinthinæ ℥ss. M.
(In ptyalism.)</p> <p>80. R. Potassæ chloratis ℥i.*
Acidi hydrochlorici ℥ii.
Aquæ f ℥viss.
(In malignant sore throat.)</p> |
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* ℥i. = 100 grains.

Stimulant Enemata.

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| <p>81. R. Olei terebinthinæ f ʒi.
Pulvis acaciæ q. s.
Mix and add—
Decocti hordei f ʒxix.
(In troublesome flatulence.)</p> <p>82. R. Tinct. assafoetidæ f ʒss.
Decocti hordei f ʒxixss. M.</p> | <p>83. R. Olei terebinthinæ.
Tinct. assafoetidæ āā f ʒss.
Decocti hordei Oi. M.</p> <p>(For the same purpose as F. 81 and 82, especially in hysteria.)</p> |
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Stimulant Powders.

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| <p>84. R. Acidi arseniosi gr. viii.—x.
Calomelanos ʒi. M.</p> <p>(In lupus, to be sprinkled over a small portion of diseased surface by means of a puff.—<i>Dupuytren.</i>)</p> | <p>85. R. Cupri subacetatis.
Pulvis sabinæ ana ʒi. M.</p> <p>86. R. Pulvis sabinæ ʒss.*
Aluminis usti.
Hydrargyri oxidi rubri ana gr. xv. M.</p> |
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Fumigations.

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| <p>87. R. Sulphuris ʒss.—ʒiss.
Iodinii gr. xx.—ʒss.* M.</p> <p>(A twelfth part of this powder to be used at a time. The vapours of sulphur and of iodine may also be used separately, in obstinate cutaneous diseases.)</p> | <p>88. R. Manganisii binoxidi ʒi.
Sodii chloridi ʒiii.</p> <p>Mix, then add—
Acidi sulphurici f ʒi.
Aquæ f ʒii.</p> <p>(Chlorine is given off from this mixture on applying heat.)</p> |
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5. NARCOTICS, ANODYNES, AND SEDATIVES.

(Including Antispasmodics belonging to these Classes.)

1. Acidum hydrocyanicum dilutum, dose miii.—m viii., cautiously increased.
2. Aconiti, folia et radix, dose of leaves, gr. ii.—gr. x. Aconiti extractum, dose gr. i.—gr. vi. Aconiti tinctura, dose m v.—m x. The doses to be cautiously increased. Aconitia (only used externally).
3. Æther and chloroform in vapour, dose mxx.—ʒi.
4. Belladonnæ folia, dose gr. ii.—gr. x. Extractum Belladonnæ, dose, gr. ¼—gr. i. Tinctura Belladonnæ, dose m x.—mxx. The doses to be cautiously increased.
5. Cannabis Indicæ extractum, dose gr. ½—gr. v.; tincturæ cannabis Indicæ (extract ʒss, rectified spirit f ʒx) m v.—ʒi.
6. Chloroformi spiritus, dose m xv.—ʒii.

* ʒi. = 100 grains.

7. Colchici cormus et semen. Extractum colchici, gr. $\frac{1}{4}$ —gr. ii. Extracti colchici acetici, gr. $\frac{1}{4}$ —gr. ii. Vinum colchici, ℥xv.—3i. Tinctura colchici seminis, ℥xv.—3i.
8. Conii folia et fructus, dose gr. ii.—gr. x. Extractum Conii, dose gr. iii.—gr. v. Tinctura Conii fructus, dose 3ss—3i. Succus Conii, dose ℥xv. to 3i.
9. Digitalis folia, dose gr. ii.—gr. x. Infusum Digitalis, dose 3ss.—f 3i. Tinctura Digitalis, dose ℥x. increased to 3ii.
10. Hyoscyami folia, dose gr. v.—gr. x. Extractum Hyoscyami, dose gr. v.—xx. Tinctura Hyoscyami, dose ℥x.—3i.
11. Lobeliæ inflatæ pulvis, dose gr. i.—gr. v. Tinctura Lobeliæ, dose ℥x.—3ss. Tinctura Lobeliæ ætherea, dose ℥x.—3ss.
12. Morphia, dose gr. $\frac{1}{4}$ —gr. i. Morphiæ hydrochloras, dose gr. $\frac{1}{4}$ —gr. i. Liquor morphiæ hydrochloratis (gr. i. in 3ii.), dose ℥xv.—3ii. Trochisci morphiæ (gr. i. in 36 lozenges), dose 1 to 15 during the day. Trochisci morphiæ et ipecacuanhæ (gr. i. in 36 lozenges).
13. Opium, dose gr. i.—gr. vi. Extractum opii, dose gr. $\frac{1}{2}$ —gr. ii. Enema opii (3ss of laudanum (=gr. ii. opium) to starch f3ii.). Extractum opii liquidum (gr. i. of extract in about ℥xxiv.). Pilula saponis composita (gr. i. in gr. v.), dose gr. v.—gr. x. ——— styracis composita (gr. i. in gr. v.), dose gr. v.—gr. x. ——— plumbi cum opio (gr. i. in viii.), dose gr. iv.—viii. Pulvis cretæ aromaticus cum opio (gr. i. in xl.), dose gr. x.—xl. ——— kino cum opio (gr. i. in xx.), dose gr. x.—xx. ——— ipecacuanhæ compositus (gr. i. in gr. x.), dose gr. x. Tinctura opii (gr. i. in ℥xv.), dose ℥v.—3ss. Tinctura camphoræ cum opio (gr. i. in 3ss), dose 3ss—f 3ss. Trochisci opii (gr. i. extract in 10 lozenges), 1 to 5 during the day. Vinum opii (gr. i. in ℥xv.), dose ℥v.—3ss.
14. Papaveris syrupus, dose, children 3i.—3ii.; infants ℥x.—℥xx.
15. Stramonii folia et semina, dose gr. ii.—gr. x. Extractum Stramonii, dose gr. $\frac{1}{4}$ —gr. iii. Tinctura Stramonii, dose ℥x.—xx.
16. Tabaci enema (tobacco gr. xx.—boiling water f3viii). Dose, the whole.
17. Veratria, dose gr. $\frac{1}{12}$ — $\frac{1}{6}$.

Narcotics, &c., in the form of Mixture and Draught.

89. R. Tincturæ opii ℥xx.
Aquæ cinnamomi.
Aquæ puræ āā 3vi. M.
(To be taken at bedtime.)

(To be taken at bed-time, with a table-spoonful of lemon-juice.)

90. R. Potassæ bicarb. gr. xx.
Aquæ menthæ viridis f 3i.
Tincturæ opii ℥xxv.
Syrupi tolutani 3i. M.

91. R. Tincturæ opii ℥xxx.
Liquoris ammoniæ acetatis 3i.
Aquæ cinnamomi.
Syrupi tolutani āā f 3ss.
M.
(To be taken at bed-time.)

92. *R.* Acidi sulphurici diluti $\mathfrak{z}\text{ii}$.
Tincturæ opii $\mathfrak{z}\text{ss}$. vel tincturæ hyoscyami $\mathfrak{z}\text{ii}$.
Tincturæ digitalis $\mathfrak{z}\text{i}$.
Infusi quassiae, $\mathfrak{f}\ \mathfrak{z}\text{vi}$.
(Dose, $\frac{1}{6}$, in states of system called "nervous.")
93. *R.* Acidi hydrocyanici diluti $\mathfrak{m}\text{xx}$.
Misturæ amygdalæ $\mathfrak{f}\ \mathfrak{z}\text{vi}$.
M. ($\frac{1}{6}$.)
94. *R.* Bismuthi albi gr. x.
Acidi hydrocyanici diluti $\mathfrak{m}\text{v}$.
Mucilaginis acaciæ $\mathfrak{f}\ \mathfrak{z}\text{i}$.
Syrupi aurantii $\mathfrak{z}\text{i}$.
M. fiat haustus. (In gastralgia.)
95. *R.* Acidi hydrocyanici diluti $\mathfrak{m}\text{xx}$.
Tincturæ digitalis $\mathfrak{z}\text{i}$.
Aquæ camphoræ.
Aquæ cinnamomi $\mathfrak{a}\mathfrak{a}\ \mathfrak{z}\text{iii}$.
M. ($\frac{1}{6}$.)
96. *R.* Tincturæ opii $\mathfrak{m}\text{iii}$.
Mucilaginis acaciæ.
Syrupi simplicis $\mathfrak{a}\mathfrak{a}\ \mathfrak{f}\ \mathfrak{z}\text{ss}$.
Aquæ destillatæ $\mathfrak{f}\ \mathfrak{z}\text{i}$.
(To procure sleep in infants: dose,
- a tea-spoonful for a child of one month, repeated every half-hour till sleep is procured. Each dose will contain about gr. $\frac{1}{32}$ of opium.)
97. *R.* Tincturæ belladonnæ $\mathfrak{z}\text{i}$.
Syrupis papaveris $\mathfrak{z}\text{vi}$.
Spiritus chloroformi $\mathfrak{z}\text{ii}$.
Aquæ menthæ piperitæ $\mathfrak{z}\text{v}$.
M. ($\frac{1}{6}$ for a dose.)
98. *R.* Potassæ nitratis $\mathfrak{O}\text{ss}$.^{*}
Tincturæ digitalis $\mathfrak{z}\text{i}$.
Liquoris ammoniæ acetatis $\mathfrak{f}\ \mathfrak{z}\text{i}$.
Aquæ destillatæ $\mathfrak{f}\ \mathfrak{z}\text{ivss}$.
Syrupi hemidesmi $\mathfrak{z}\text{ss}$. M. ($\frac{1}{6}$.)
99. *R.* Tincturæ semiuvis colchici $\mathfrak{z}\text{iss}$.
Infusi digitalis $\mathfrak{z}\text{iii}$.
Aquæ cinnamomi $\mathfrak{z}\text{iii}$. M. ($\frac{1}{6}$.)
100. Pulv. tragacanth. co. $\mathfrak{z}\text{i}$.
Spiritus chloroformi $\mathfrak{z}\text{ss}$.
Vini ipecacuanhæ $\mathfrak{m}\text{x}$.
Syrupi tolutani $\mathfrak{f}\ \mathfrak{z}\text{ii}$.
Aquæ $\mathfrak{f}\ \mathfrak{z}\text{vi}$. M. fiat haustus.
(In troublesome coughs.)

Narcotics, &c., in the form of Pill.

101. *R.* Extracti conii gr. iii.
Bismuthi albi gr. v.
Fiat pilula.
Ext. hyoscyami $\mathfrak{a}\mathfrak{a}\ \text{gr. xx}$.
M.
Divide into twelve pills. (In bronchitis, asthma, &c.)
102. *R.* Extracti belladonnæ gr. iv.
Pulvis ipecac. c. $\mathfrak{a}\mathfrak{a}\ \text{gr. xx}$.
M.
(Divide into sixteen pills, one to be given every four or six hours. In pertussis and scarlatina.)
103. *R.* Pulvis digitalis.
— scillæ.
104. *R.* Camphoræ pulvis.
Ext. hyoscyami ana gr. ii. ss.
Spiritus rectificatus q. s.
M. (To be taken at bed-time.)
105. *R.* Extracti hyoscyami gr. ii. —v.
Extracti conii gr. iii. M.
(To be taken at bed-time.)

^{*} $\mathfrak{O}\text{i}$. = 100 grains.

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|---|---|
| <p>106. R. Extract conii gr. iv.
 Pulv. ipecac. gr. ii.
 Morphiæ hydrochlor. gr. $\frac{1}{8}$
 (Divide into two pills.)</p> <p>107. R. Extracti stramonii gr. i.
 Extracti glycyrrhizæ $\mathfrak{O}$ss.*
 M.
 (To be made into six pills. One</p> | <p>to be taken occasionally as a lozenge when the cough is troublesome. In irritation of the larynx or throat.)</p> <p>108. R. Extracti aconiti gr. iii.
 Extracti glycyrrhizæ gr. xx.
 M. (Divide into six pills.)</p> |
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Narcotics, &c., in the form of Powder.

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|--|---|
| <p>109. R. Pulv. ipecac. comp. gr. i.
 Sacchari. gr. xx. M.
 (Divide into four powders. For young infants. Each powder contains $\frac{1}{40}$ gr. of opium.)</p> | <p>110. R. Camphoræ gr. iii.
 Spirit. vin. rect. $\mathfrak{m}$ii.
 Pulv. ipecac. c. gr. v. M.
 (A powder to be taken at bedtime.)</p> |
|--|---|

6. EXTERNAL SEDATIVE APPLICATIONS.

1. Cataplasma conii.
2. Chloroformum.
3. Decoctum papaveris.
4. Emplastrum belladonnæ; opii (gr. i. of the powder in gr. x.)
5. Extractum aconiti; belladonnæ; conii; hyoscyami; opii; opii liquidum; stramonii.
6. Linimentum aconiti; belladonnæ; chloroformi; opii (gr. i. in $\mathfrak{m}$ xxx.)
7. Unguentum aconitiæ (gr. viii. in $\mathfrak{z}$ i.); atropiæ (gr. viii. in $\mathfrak{z}$ i.); belladonnæ (gr. lxxx. to $\mathfrak{z}$ i.); gallæ cum opio (gr. i. in about gr. xiv.); veratriæ (gr. viii. in $\mathfrak{z}$ i.).

Several preparations of the Pharmacopœia enumerated among narcotics and sedatives at pp. 746, 747 also admit of external application. All substances, too, which produce cold by evaporation or otherwise, may be said to belong to the class of sedatives.

Sedative Lotions.

- | | |
|---|--|
| <p>111. R. Potassæ carbonatis gr. xii.
 Tincturæ opii $\mathfrak{m}$xxx.
 Aquæ $\mathfrak{z}$i. M.</p> <p>112. R. Tincturæ opii.
 Acidi hydrocyanici, dil.
 aa partes æquales.
 M. fiat Lotio.</p> <p>113. R. Liquoris potassæ $\mathfrak{z}$ii.</p> | <p>Acidi hydrocyanici diluti
 f $\mathfrak{z}$iss.
 Misturæ amygdalæ f $\mathfrak{z}$viss.
 M. (A lotion in prurigo.)</p> <p>114. R. Liquoris plumbi subacetatis $\mathfrak{z}$i.
 Acidi acetici diluti.
 Spiritûs rectificati aa f $\mathfrak{z}$ss.
 Aquæ destillatæ f $\mathfrak{z}$xi. M.</p> |
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* $\mathfrak{O}$ i. = 100 grains.

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|---|---|
| 115. R. Extracti belladonnæ gr. ii.
Extracti opii ana gr. ii.
Aquæ ℥i. M. | 117. R. Extracti conii gr. x.
Extracti opii. gr. iii.
Aquæ ferventis ℥i. M. |
| 116. R. Potassii cyanidi gr. x.
Mist. amygdalæ f ℥vi. M.
(In chronic itching eruptions. Cy-
anide of potassium is not offi-
cinal.) | 118. R. Vini opii ℥xx.
Liquoris ammoniæ ace-
tatis ℥ss.
Aquæ ℥ss. M. |

Cold Applications.

- | | |
|---|---|
| 119. R. Sodii chloridi.
Potassæ nitratis.
Ammoniæ hydrochloratis
āā ℥ii.
Mix, and dissolve in water. (A
frigorific mixture, applicable
whenever intense cold is re-
quired.) | 120. R. Ammoniæ nitratis.
Aquæ āā lb. i. Dissolve.
(In winter, mix equal parts of
snow and common salt. In
summer, equal parts of pounded
ice and salt.) |
|---|---|

Sedative Fomentations.

- | | |
|--|---|
| 121. R. Opii ℥i.*
Aquæ ferventis Oi. M. | 122. R. Extracti belladonnæ ℥ss*
Aquæ ferventis Oi. M. |
|--|---|

Sedative Ointments.

- | | |
|--|--|
| 123. R. Plumbi acetatis gr. xxx.
Acidi hydrocyanici dil.
℥iii.
Unguenti simplicis ℥iii. M.
(In cases of eczema.) | Unguenti simplicis ℥ii. M.
(In lichen and prurigo.)
125. R. Extracti conii.
Adipis ana ℥i. M. |
| 124. R. Potassii cyanidi gr. xii.
Olei amygdalæ ℥ii. | 126. R. Pulvis opii ℥ss.*
Adipis ℥i. M. |

Sedative Liniments.

Those above enumerated.

Sedative Enemata, &c.

The Enema Opii and Enema Tabaci of the British Pharmacopœia

As a suppository, the Pilula saponis composita.

127. R. Foliorum belladonnæ gr. xii.
 Aquæ ferventis f ℥vi. M.
 (In spasm of the urethra.)

* ℥i. = 100 grains.

7. STIMULANTS, IN COMBINATION WITH NARCOTICS,
SEDATIVES, AND ANODYNES.

(Including Stimulant and Anodyne Antispasmodics.)

In the form of Draught or Mixture.

- | | |
|--|---|
| <p>128. R. Tr. valerianæ ammon. ʒss.
Spiritus ætheris ʒi.
Tincturæ hyoseyami ʒss.
Aquæ camphoræ f ʒi. M.
(A draught, in hysteria.)</p> <p>129. R. Ammoniac carbonatis gr. x.
Aquæ camphoræ ʒx.
Syrupi aurantii ʒii.
Tinct. opii ℥x.—xxx. M.
Succi limonis recentis q. s.</p> <p>130. R. Moschi gr. x.
Ætheris.
Tincturæ opii āā ℥xx.
Aquæ cinnamomii f ʒi. M.
(In the typhous condition.)</p> <p>131. R. Aquæ camphoræ ʒiii.
Spiritus ætheris.
Tinct. camphor. cum opio.
Syrupi papav. āā ʒi. M.
fiat haustus.</p> | <p>132. R. Extracti opii liquidi ℥x.
Misturæ camphoræ f ʒi. M.</p> <p>133. R. Tinct. opii ʒss.
Mist. camphoræ f ʒi. M.</p> <p>134. R. Tincturæ opii ʒi.
Spiritus ætheris f ʒss.
Aquæ camphoræ f ʒvss.
M. (½.)</p> <p>135. R. Aquæ camphoræ f ʒv.
Spiritus ætheris ʒii.
Tincturæ opii ℥xl.
Pulveris mosehi gr. xl.
Spt. ammon. arom. ʒi.
M. (½.)</p> <p>136. R. Spiritus ætheris ʒii.
Tincturæ opii ℥xxx.
T. valerianæ ammon. f ʒss.
Spiritus cinnamomi f ʒi.
Aquæ anethi f ʒivss. M.
(A fourth part for a dose. In
gastralgia, flatulence, &c.)</p> |
|--|---|

In the form of Pill.

- | | |
|---|--|
| <p>137. R. Camphoræ.
Mosehi.
Assafœtidæ, sing. gr. iii.
Opium gr. i.
Olei anethi q. s. M.
Divide into two pills. (One every
three hours. In hysteria.)</p> <p>138. R. Castorei gr. xx.
Pulvis opii gr. i.
Olei menthæ pulegii q. s.
Divide into six pills. (To be</p> | <p>taken at short intervals in
hysteria.)</p> <p>139. R. Camphoræ gr. viii.
Olei cajuputi ℥iv.
Pulveris opii gr. ii.
Extraeti hyosciami gr. vi.
(Divide into two or four pills.)</p> <p>140. R. Kreasoti ℥iv.
Pulvis opii gr. ii.
Ext. hyosciami gr. viii.
(Divide into four pills.)</p> |
|---|--|

8. EXTERNAL APPLICATIONS (STIMULANT and SEDATIVE).

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|---|--|
| 141. R. Lin. saponis comp. f $\frac{3}{4}$ ss.
Tincturæ opii f $\frac{3}{4}$ ss. M.

142. R. Olei cajuputi f $\frac{3}{4}$ ss.
Tincturæ opii f $\frac{3}{4}$ ss.
Linimenti terebinthinæ
$\frac{3}{4}$ ii. M.

143. R. Linimenti belladonnæ
Linimenti chloroformi
partes æquales. M. | 144. R. Tincturæ cantharidis f $\frac{3}{4}$ ss.
Linimenti camphoræ f $\frac{3}{4}$ i.
Liquoris ammoniæ $\frac{3}{4}$ i.
Tincturæ opii $\frac{3}{4}$ iii. M.

145. R. Olei crotonis $\mathfrak{m}\text{x}$.
Linimenti saponis com-
positi f $\frac{3}{4}$ i.
Tincturæ opii f $\frac{3}{4}$ ss. M. |
|---|--|

ENEMATA (Stimulant and Sedative).

- | | |
|--|---|
| 146. R. Tincturæ assafoetidæ f $\frac{3}{4}$ ss
Tincturæ opii $\frac{3}{4}$ i.
Decocti hordei Oss. M.
(In flatulent colic, tympanites, &c.) | 147. R. Camphoræ gr. xx.
Olei terebithinæ f $\frac{3}{4}$ i.
Decocti hordei Oss. M.
(In the same.) |
|--|---|

8. TONICS.

1. MINERAL.

Mineral Acids.

- | | |
|--|---|
| 1. Acidum hydrochloricum dilutum | dose $\mathfrak{m}\text{x}$. to $\mathfrak{m}\text{xxx}$. |
| 2. Acidum nitricum dilutum | „ $\mathfrak{m}\text{x}$.— $\mathfrak{m}\text{xxx}$. |
| 3. Acidum nitro-hydrochloricum dilutum | „ $\mathfrak{m}\text{x}$.— $\mathfrak{m}\text{xxx}$. |
| 4. Acidum phosphoricum dilutum | „ $\mathfrak{m}\text{x}$.— $\mathfrak{m}\text{xxx}$. |
| 5. Acidum sulphuricum aromaticum | „ $\mathfrak{m}\text{x}$.— $\mathfrak{m}\text{xxx}$. |
| 6. Acidum sulphuricum dilutum | „ $\mathfrak{m}\text{x}$.— $\mathfrak{m}\text{xxx}$. |

Preparations of Iron.

- | | |
|--|---|
| 7. Ferri et ammoniæ citras | dose gr. v. to gr. x. |
| 8. Ferri arsenias | „ gr. $\frac{1}{16}$ — gr. $\frac{1}{12}$. |
| 9. Ferri carbonas saccharata. | „ gr. x. — $\mathfrak{O}\text{i}$.* |
| 10. Ferri iodidum | „ gr. v. — gr. x. |
| 11. Ferri et quiniæ citras | „ gr. v. — gr. x. |
| 12. Ferrum tartaratum | „ gr. v. — gr. x. |
| 13. Ferri oxidum magneticum | „ gr. v. — gr. xxx. |
| 14. Ferri peroxidum | „ gr. v. — $\mathfrak{O}\text{i}$.* |
| 15. Ferri peroxidum hydratum | „ gr. v. — $\frac{3}{4}$ iii. |
| 16. Ferri phosphas | „ gr. v. — gr. xx. |
| 17. Ferri sulphas | „ gr. i. — gr. x. |
| 18. Ferri sulphas exsiccata | „ gr. i. — gr. v. |
| 19. Ferri sulphas graulata | „ gr. i. — gr. x. |

* $\mathfrak{O}\text{i}$. = 100 grains.

20. Ferrum redactum dose gr. i. to gr. x.
 21. Liquor ferri perchloridi „ m iii.—m. x.
 22. Liquor ferri pernitratidis „ m v.—m_{xxx}.
 23. Mistura ferri composita f_{3i}.
 24. Pilula ferri carbonatis (gr. v. = gr. iv. ferri carb. sacchar.) „ gr. v. — gr. xxx.
 25. Pilula ferri iodidi (gr. v. = gr. i $\frac{1}{3}$ nearly FeI) „ gr. v. — gr. xx.
 26. Syrupus ferri iodidi (3i. = gr. v. FeI) . „ 3ss. — 3ii.
 27. Syrupus ferri phosphatis „ 3i. — 3iv.
 28. Tinctura ferri perchloridi. , . . . „ m_x. — m_{xxx}.
 29. Emplastrum ferri.

Preparations of Zinc.

30. Zinci acetas dose gr. ii. to gr. v.
 31. Zinci carbonas „ gr. ii.—gr. v.
 32. Zinci oxydum „ gr. ii.—gr. v., or more.
 33. Zinci sulphas „ gr. ii.—gr. v., or more.
 34. Zinci valerianas „ gr. i. — gr. v.

Preparation of Copper.

35. Cupri sulphas dose gr. $\frac{1}{4}$ to gr. ii.

Preparations of Arsenic.

36. Acidum arseniosum. dose gr. $\frac{1}{20}$ to gr. $\frac{1}{3}$.
 37. Ferri arsenias „ gr. $\frac{1}{16}$ to gr. $\frac{1}{12}$.
 38. Liquor arsenicalis (gr. iv in f_{3i}., or $\frac{1}{24}$ gr. in five drops), dose m_v., gradually increased.
 39. Liquor sodæ arseniatis (gr. iv. in f_{3i}., or $\frac{1}{24}$ gr. in five drops), dose same as preceding preparation.

Preparations of Silver.

40. Argenti oxydum dose gr. $\frac{1}{2}$ to gr. i.
 41. Argenti nitras „ gr. $\frac{1}{4}$ — gr. i.

Preparation of Bismuth.

42. Bismuthum album dose gr. x. to gr. xx.

2. VEGETABLE TONICS.

Unless otherwise specified the doses are as follows :

- Extractum dose gr. iii. to gr. x.
 Decoctum } „ f_{3ss}. — f_{3ii}.
 Infusum }
 Tincturæ. „ 3ss. — 3ii.
 43. Anthemidis extractum, infusum.
 44. Aurantii infusum, syrupus, tinctura.
 45. Berberiæ sulphas—dose, gr. v. to x.
 46. Calumbæ extractum, infusum, tinctura.
 47. Cascarillæ infusum, tinctura.

48. Chiratae infusum, tinctura.
 49. Cinchouæ flavæ extractum liquidum (dose ʒss. to ʒiss.), decoctum infusum, tinctura.
 50. Cinchonæ pallidæ tinctura composita.
 51. Cuspariæ infusum.
 52. Gentianæ extractum, infusum compositum, tinctura.
 53. Lupuli extractum, infusum, tinctura.
 54. Nucis vomicæ extractum (dose gr. $\frac{1}{4}$ to gr. ii.), tinctura (℥x. to ℥xx).
 55. Pareiræ extractum liquidum (dose ʒss. to ʒiss.) decoctum.
 56. Quassiæ extractum, infusum.
 57. Quiniæ sulphas (dose gr. i. to gr. v.) tinctura composita (dose ʒi. ʒiv.)
 58. Serpentariæ, infusum, tinctura.
 59. Strychnia (dose gr. $\frac{1}{32}$ to gr. $\frac{1}{8}$).
 60. Strychiæ liquor ℥v. gr. = $\frac{1}{24}$ (dose ℥iii. to ℥xv.).
 61. Uvæ ursi infusum.

Tonics in the form of Mixture or Draught.

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|--|--|
| 148. R. Quiniæ disulphatis gr. xii.
Tiucturæ aurantii f ʒi.
Infusi rosæ acidi f ʒv. M. | 155. R. Infusi cuspariæ f ʒvi.
Spiritus chloroformi ʒii.
M. ($\frac{1}{6}$.) |
| 149. R. Liquoris arsenicalis f ʒss.
Decocti cinchonæ flavæ f ʒvi. M. ($\frac{1}{6}$.) | 156. R. Infusi cascarillæ f ʒv.
Tincturæ lupuli.
Tincturæ aurantii ana f ʒss. M. (i.) |
| 150. R. Infusi anthemidis f ʒvi.
Acidi nitrici diluti ʒii. M. ($\frac{1}{6}$.) | 157. R. Infusi lupuli f ʒvi.
Tiucturæ nucis vomicæ ʒi. M. ($\frac{1}{6}$.) |
| 151. R. Infusi aurantii f ʒvss.
Tincturæ serpentariæ ʒiii. M. ($\frac{1}{6}$.) | 158. R. Decocti cinchonæ flavæ ʒvi.
Acidi sulphurici diluti ʒiss. M. ($\frac{1}{6}$.) |
| 152. R. Berberiæ sulphatis gr. xx.
Infusi chiratæ f ʒvi. Dissolve. ($\frac{1}{6}$.) | 159. R. Infusi lupuli ʒv.
Extr. pareiræ liquidi ʒvi.
Acidi hydrochlorici diluti ʒii. M. ($\frac{1}{6}$.) |
| 153. R. Infusi calumbæ f ʒvi.
Acidi nitro-hydrochlorici diluti ʒii. M. ($\frac{1}{6}$.) | 160. R. Tincturæ ferri perchloridi ʒii.
Infusi quassiæ ʒvi. M. ($\frac{1}{6}$.) |
| 154. R. Infusi calumbæ f ʒv.
Sodæ bicarbonatis ʒss.*
Tincturæ cascarillæ f ʒi.
Dissolve. ($\frac{1}{6}$.) | |

* ʒi. = 100 grains.

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| <p>161. R. Ferri et quiniæ citratis gr. xxx.
Syrupi aurantii floris ʒvi.
Aquæ cinnamomi ʒvss. M.</p> <p>162. R. Ferri sulphatis gr. xii.
Quiniæ sulphatis gr. vi.
Acidi sulphurici diluti ʒiss.
Aquæ menthæ piperitæ ʒvi. M. (½.)</p> <p>163. R. Ferri tartarati gr. xxx.
Infusi quassia ʒvi. M.</p> <p>164. R. Ferri et ammoniæ citratis gr. xxx.
Spiritus ammoniæ aromatici ʒiii.
Infusi quassia ʒvss. M.</p> | <p>165. R. Ferri iodidi gr. xxx.
Spiritus myristicæ ʒiii.
Infusi quassia ʒvss. M.</p> <p>166. R. Ferri sulphatis gr. xvi.
Magnesiæ sulphatis ʒiii.
Acidi sulphurici diluti ʒiii.
Aquæ menthæ piperitæ ʒvss. M. (½.)</p> <p>167. R. Acidi phosphorici diluti f ʒi.
Syrupi aurantii f ʒi.
Aquæ f ʒxix. M. (To be used as a common drink.)</p> <p>168. R. Zinci oxidi gr. xxx.
Magnesiæ ʒi.*
Tincturæ cascariellæ.
Infusi aurantii. M. (½.)</p> |
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- Tonics in the form of Pill.*
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|---|--|
| <p>169. R. Cupri sulphatis gr. iii.
Pilulæ saponis compositæ gr. xv.
Extracti calumbæ gr. xv.
Make twelve pills.</p> <p>170. R. Zinci sulphatis gr. xxiv.
Extracti quassia gr. xxiv.
Make twelve pills.</p> <p>171. R. Zinci valerianatis gr. xxiv.
Extracti anthemidis gr. xxiv. Make twelve pills.
They may be varnished with gelatin.</p> <p>172. R. Ferri iodidi gr. xxxvi.
Extracti calumbæ gr. xxiv.
Make twelve pills.</p> <p>173. R. Ferri sulphatis exsiccata gr. xxx.
Extracti anthemidis gr. xxx.
Make twelve pills.</p> | <p>174. R. Quiniæ disulphatis gr. xii.
Extracti gentianæ gr. xxxvi.
Make twelve pills.</p> <p>175. R. Strychniæ gr. i.
Extracti quassia ʒi.*
Make thirty-two pills.</p> <p>176. R. Argenti oxidi gr. xii.
Extr. gentianæ gr. xxxvi.
Make twelve pills.</p> <p>177. R. Argenti nitratis gr. vi.
Extr. hyosciami gr. xxxvi.
Make twelve pills.</p> <p>178. R. Acidi arseniosi gr. i.
Extr. conii
,, gentianæ ana gr. xxx.
Make twenty pills.</p> <p>179. R. Bismuthi albi gr. xxx.
Extr. hyosciami gr. xxx.
Make twelve pills.</p> |
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* ʒ = 100 grains.

Tonics in the form of Powder.

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| 180. R. Ferri redacti gr. iii.
Pulvis aromatici gr. v.
Mix for a powder. | 182. R. Ferri phosphatis gr. iii.
Pulveris aromatici gr. v.
Mix for a powder. |
| 181. R. Ferri carbonatis saccharatæ
gr. x.
Pulveris aromaticæ gr. v.
Mix for a powder. | 183. R. Ferri oxidi magnetici
gr. iii.
Pulvis aromatici gr. v.
Mix for a powder. |

9. ASTRINGENTS.

(a) Mineral.

- | | |
|---|-----------------------------|
| 1. The mineral acids | |
| 2. Alumen | dose gr. x. to ℥ss.* |
| 3. Alumen exsiccatum | „ gr. v. — gr. xv. |
| 4. Cretæ misturæ | „ f ʒi. — f ʒii. |
| 5. Argenti nitras | |
| 6. Cupri sulphas | |
| 7. Ferri perchloridi, liquor et tinctura, | } Dose, see Tonics, p. 752. |
| „ pernitratris liquor | |
| „ sulphas exsiccata, et granulata, | |
| 8. Hydrargyri corrosivum sublimatum | |
| 9. Plumbi acetas | „ gr. i. — gr. v. |
| 10. Zinci sulphas et acetas | „ gr. ii. — gr. v. |

(b) Vegetable.

- | | |
|--|----------------------|
| 1. Belæ extractum liquidum | dose ʒi. — ʒiv. |
| 2. Catechu, nigrum, et pallidum | „ gr. x. — gr. xxx. |
| 3. „ pulvis compositus | „ gr. v. — gr. xxx. |
| 4. „ tinctura | „ ʒss. — ʒii. |
| 5. „ infusum | „ f ʒi. — f ʒii. |
| 6. „ trochisci | „ ii. — xx. |
| 7. Cinchona pallida | „ gr. xxx — ℥ss.* |
| 8. Cinchonæ tinctura composita | „ ʒss. — ʒii. |
| 9. Granati radiceis decoctum | „ f ʒi. — f ʒ ii. |
| 10. Hæmatoxyli decoctum | „ f ʒ i. — f ʒ ii. |
| 11. Hæmatoxyli extractum | „ gr. x. — ʒss. |
| 12. Kino cum opio pulvis (1 gr. opium in
xx grs.) | „ gr. v. — gr. xx. |
| 13. Kino tinctura | „ ʒss. — ʒii. |
| 14. Kramerix extractum | „ gr. v. — x. |
| 15. Kramerix infusum | „ f ʒ iss. — f ʒ ii. |
| 16. Kramerix tinctura | „ ʒss. — ʒii. |
| 17. Kreasotum | „ m̄i. — m̄ iii. |
| 18. Kreasoti mistura | „ f ʒi. — f ʒii. |

* ℥i. = 100 grains.

19. Maticæ infusum	dose f ʒii. to ʒ iv.
20. Pterocarpus santalinus	"
21. Lavendulæ tinctura composita	" ʒ ss. — ʒ ii.
22. Quercûs pulvis	" ʒ ss. — ʒ ii.
23. Quercûs decoctum	" f ʒ i. — f ʒ ii.
24. Gallæ pulvis	" gr. x. — ʒ ss.
25. Gallæ tinctura	" ʒ ss. — ʒ ii.
26. Gallæ unguentum cum opio	" gr. x. — gr. xxx.
27. Acidum tannicum	" gr. i. — gr. v.
28. Acidi tannici trochisci	" ii. — xx.
29. Acidi tannici suppositoria	" gr. x. — gr. xxx.
30. Acidum gallicum	" gr. i. — gr. v.
31. Rosæ (gallicæ) infusum acidum	" f ʒi. — f ʒii.
32. Rosæ (gallicæ) confectio	" ʒss. — ʒii.
33. Rosæ (gallicæ) syrupus	" ʒ ii. — ʒ ii.
34. Rosæ caninæ confectio	" ʒss. — ʒii.
35. Ulmi decoctum	" f ʒii. — f ʒiv.
36. Uvæ ursi, infusum	" f ʒi. — ʒii.

(c) *Mineral and Vegetable.*

1. Pilula plumbi cum opio dose gr. ii. to gr. viii.
2. Pulvis cretæ aromaticus " gr. x. — gr. xxx.
3. Pulvis cretæ aromaticus cum opio " gr. x. — gr. xx.

Astringents in the form of Mixture or Draught.

184. R. Aluminis ʒss.* Infusi rosæ acidi f ʒv. Syrupi rhæados f ʒi. M. (½.)	189. R. Tincturæ ferri perchloridi ʒii. Infusi quassiae f ʒvi. M. (½.)
185. R. Acidi sulph. diluti f ʒss. Infusi rosi acidi f ʒvi. Syrupi rhæados f ʒii. Aquæ destillatæ f ʒxii. (To be used as a common drink.)	190. R. Liquoris ferri pernitratis ʒi. Syrupi aurantii floris ʒiii. Aquæ ʒvss. M. (½.)
186. R. Acidi nitro-hydrochlorici diluti ʒiii. Tincturæ kino ʒv. Infusi uvæ ursi f ʒv. M. (½.)	191. R. Extracti belæ liquidi ʒvi. Infusi cuspariæ f ʒvss. M. (½.)
187. R. Misturæ cretæ f ʒvii Syrupi papaveris f ʒi. M. (Dose, ½ after every liquid motion.)	192. R. Tincturæ cinchonæ com- positæ f ʒi. Infusi uvæ ursi f ʒv. M. (½.)
188. R. Pulvis aromaticæ ʒii. Tincturæ opii ʒss. Misturæ cretæ f ʒvi. M. (½.)	193. R. Tincturæ lavandulæ com- positæ f ʒi. Infusi krameriae f ʒv. M. (½.)
	194. R. Syrupi rosæ gallicæ f ʒi. Infusi catechu f ʒv. M. (½.)

* ʒi. = 100 grains.

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| 195. R. Acidi gallici gr. xviii.
Tincturæ opii ℥ xxx.
Infusi rosæ acidi f ʒvi.
M. ($\frac{1}{6}$) | 196. R. Tincturæ Krameriæ f ʒi.
Decocti hæmatoxyli f ʒv.
M. ($\frac{1}{6}$) |
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Astringents in the form of Pill.

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|---|--|
| 197. R. Pilulæ plumbi cum opii
gr. xxiv.
Confectionis rosæ gallicæ
gr. xxiv. Make twelve
pills, (each contains $\frac{1}{4}$
grain opium and $1\frac{1}{2}$
acetate of lead). | 199. R. Acidi gallici gr. iiss.
Morphiæ gr. $\frac{1}{16}$.
Confectionis rosæ gallicæ
q. s. Make a pill. |
| 198. R. Acidi gallici gr. iii.
Plumbi acetatis gr. i.
Mucilaginis acaciæ q. s.
Make a pill. | 200. R. Plumbi acetatis gr. i.
Pilulæ saponis compositæ
gr. ii.
Make a pill. |
| | 201. R. Zinci sulphatis gr. ii.
Pulvis opii gr. $\frac{1}{4}$.
Extracti rhei gr. iii.
Make a pill. |

Formulæ for other astringent pills are given under Tonics. See formulæ p. 755.

Astringents in the form of Powder.

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| 202. R. Pulvis cinchonæ pallidæ
gr. xl.
Acidi gallici gr. ii.
Mix for a powder. | 203. R. Pulvis cretæ aromaticæ
cum opio gr. x.
Pulvis catechu compositæ
gr. x. Mix for a powder |
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Astringent Lotions.

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| 204. R. Acidi nitrohydrochlorici
diluti ʒss.
Tincturæ opii ʒss.
Aquæ f ʒi. | 209. R. Liquoris plumbi sub-
acetatis ℥ xx.
Glycerini ʒi.
Aquæ rosæ ʒvii. |
| 205. R. Argenti nitratis gr. ii. to
gr. xl.
Aquæ destillatæ f ʒi. | 210. R. Liquoris plumbi subace-
tatis ℥ x to xxx.
Spiritûs rectificati ℥ xxx.
Aquæ destillatæ ʒvii. |
| 206. R. Liquoris calcis. f ʒi.
Olei olivæ f ʒii. | 211. R. Zinci chloridi gr. i.
Aquæ ʒi. |
| 207. R. Cupri sulphatis gr. iii. to
gr. xl.
Aquæ camphoræ f ʒi. | 212. R. Zinci sulphatis gr. v.
Tincturæ lavendulæ com-
positæ ℥ xxx.
Aquæ ʒi. |
| 208. R. Acidi tannici gr. x.
Acidi hydrochlorici diluti
ʒss.
Aquæ f ʒi. | 213. R. Zinci sulphatis gr. i. to x.
Aquæ rosæ ʒi. |

Astringent Injections.

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|---|---|
| <p>214. R. Aluminus $\mathfrak{Oss}^*$
Decocti quercûs Oi.</p> <p>215. R. Argenti nitratis gr. iss.
Acidi nitrici diluti $\mathfrak{m}$ ii.
Aquæ destillatæ f $\mathfrak{z}$i.</p> <p>216. R. Cupri sulphatis gr. ii.
to gr. v.
Aquæ f $\mathfrak{z}$i.</p> | <p>217. R. Liquoris ferri perchloridi
$\mathfrak{m}$ iii.
Aquæ f $\mathfrak{z}$i.</p> <p>218. R. Liquoris plumbi sub-
acetatis $\mathfrak{m}$ x.
Extracti opii liquidi
$\mathfrak{m}$ xxx.
Aquæ destillatæ f $\mathfrak{z}$i.</p> <p>219. R. Zinci sulphatis
Aluminis ana gr. ii.
Aquæ $\mathfrak{z}$i.</p> |
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Astringent Collyria.

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| <p>220. R. Aluminis gr. iii. to gr. x.
Aquæ f $\mathfrak{z}$i.</p> <p>221. R. Argenti nitratis gr. i. to
gr. ii.
Aquæ destillatæ f $\mathfrak{z}$i.</p> <p>222. R. Cupri sulphatis gr. i. to
gr. v.
Aquæ f $\mathfrak{z}$i.</p> | <p>223. R. Hydraggyri corrosivi sub-
limati gr. $\frac{1}{20}$.
Aquæ f $\mathfrak{z}$i.</p> <p>224. R. Plumbi acetatis gr. ii.
Aquæ destillatæ f $\mathfrak{z}$i.</p> <p>225. R. Zinci sulphatis gr. i. to
gr. v.
Vini opii $\mathfrak{z}$i.
Aquæ $\mathfrak{z}$vii.</p> |
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Astringent Gargles.

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| <p>226. R. Aluminis $\mathfrak{z}$i.
Acidi sulphurici aroma-
tici $\mathfrak{z}$ss.
Tincturæ Myrrhæ $\mathfrak{z}$ii.
Decocti cinchonæ f $\mathfrak{z}$vi. M.</p> | <p>227. R. Acidi tannici $\mathfrak{Oss}^*$
Spiritus rectificati f $\mathfrak{z}$ss.
Aquæ Camphoræ f $\mathfrak{z}$vss. M.
(Stimulant and astringent.)</p> |
|---|---|

Astringent Ointments.

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|---|--|
| <p>228. R. Argenti nitratis gr. xx.
Adipis $\mathfrak{z}$i.</p> <p>229. R. Acidi sulphurici $\mathfrak{z}$ss.
Adipis $\mathfrak{z}$i.</p> <p>230. R. Cretæ $\mathfrak{z}$i.
Olei olivæ $\mathfrak{z}$i.
Adipis $\mathfrak{z}$ss. M.
(For burns and scalds.)</p> | <p>231. R. Cupri sulphatis gr. xxx.
Adipis $\mathfrak{z}$i.</p> <p>232. R. Hydraggyri corrosivi sub-
limati gr. v.
Adipis $\mathfrak{z}$i.</p> <p>233. R. Liquoris plumbi sub-
acetatis $\mathfrak{z}$i.
Adipis $\mathfrak{z}$i.</p> |
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* $\mathfrak{O}$ l. = 100 grains.

10. DEPRESSANTS.

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|---|--|
| 1. Acidum hydrocyanicum dilutum | dose ℥ii. to ℥ viii. |
| 2. Antimonii oxidum | „ gr. i. — gr. v. |
| 3. Antimonium sulphuratum | „ gr. i. — gr. v. |
| 4. Antimonium tartaratum | „ gr. $\frac{1}{8}$ — gr. $\frac{1}{2}$ or more. |
| 5. Antimoniale vinum (gr. i. in f $\frac{3}{4}$ ss.) | „ $\frac{3}{4}$ ss. — $\frac{3}{4}$ ii. |
| 6. Antimonialis pulvis (i gr. teroxide
in iii gr.) | „ gr. iii. — gr. xv. |
| 7. Colchici seminis tinctura | „ ℥xx. — $\frac{3}{4}$ i. |
| 8. Colchici extractum | „ gr. i. — gr. iii. |
| 9. Colchici extractum aceticum | „ gr. i. — gr. iii. |
| 10. Colchici vinum | „ ℥xx. — $\frac{3}{4}$ ii. |
| 11. Digitalis infusum | „ f $\frac{3}{4}$ i. — f $\frac{3}{4}$ ii. |
| 12. Digitalis tinctura | „ ℥xv. — $\frac{3}{4}$ i. |
| 13. Digitalinum | „ gr. $\frac{1}{30}$. |
| 14. Ipecacuanahæ pulvis | „ gr. v — gr. x. |
| 15. Ipecacuanahæ vinum | „ ℥xv. — $\frac{3}{4}$ i. |
| 16. Lobeliæ tinctura | „ ℥xx. — $\frac{3}{4}$ i. |
| 17. Lobeliæ tinctura ætherea | „ ℥xx. — $\frac{3}{4}$ i. |
| 18. Scillæ syrupus | „ $\frac{3}{4}$ i. — $\frac{3}{4}$ ii. |
| 19. Scillæ tinctura | „ $\frac{3}{4}$ ss. — $\frac{3}{4}$ i. |
| 20. Tabaci enema | „ f $\frac{3}{4}$ iv. — f $\frac{3}{4}$ vi. |

It must be borne in mind that these are *depressant* doses. As a depressant remedy, tartar emetic is greatly to be preferred to all other medicines. James's powder is a preparation of similar but less certain action.

Depressants in the form of Draught or Mixture.

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| 234. R. Vini antimonialis f $\frac{3}{4}$ ss.
Aquæ destillatæ f $\frac{3}{4}$ vss.
$\frac{1}{4}$ every 10 minutes. | 237. R. Tincturæ digitalis f $\frac{3}{4}$ ss.
Aquæ cinnamomi f $\frac{3}{4}$ ii.
Aquæ f $\frac{3}{4}$ iiiss. M. ($\frac{1}{4}$ to $\frac{1}{6}$.) |
| 235. R. Digitalini gr. $\frac{1}{10}$.
Spiritus rectificati $\frac{3}{4}$ ss.
Aquæ cinnamomi $\frac{3}{4}$ iiiss($\frac{1}{4}$) | 238. R. Acidi hydrocyanici diluti
$\frac{3}{4}$ i.
Misturæ amygdalæ f $\frac{3}{4}$ vi.
M. ($\frac{1}{6}$.) |
| 236. R. Tincturæ lobeliæ f $\frac{3}{4}$ ss.
Aquæ anethi f $\frac{3}{4}$ ii.
Aquæ f $\frac{3}{4}$ ivss. M. $\frac{1}{6}$. | 239. R. Vini ipecacuanhæ f $\frac{3}{4}$ ss.
Aquæ cinnamomi f $\frac{3}{4}$ i.
Aquæ f $\frac{3}{4}$ ivss. M. ($\frac{1}{6}$ or $\frac{1}{4}$.) |

Depressants in the form of Powder.

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|---|---|
| 240. R. Antimonii tartarati gr. i.
Sacchari albi gr. xxxi. M.
(This powder may be easily divided into fractional parts, and | may be given three or four times a day in doses proportioned to the age, in the inflammatory affections of young children.) |
|---|---|

241. R. Antimonii tartarati gr. i.
Pulvis ipecacuanhæ gr.
xx. M.

Divide into eight powders. (One
to be taken three or four times
a day.)

Hydrargyri c. cretâ gr. xii.
Sacchari albi ʒi. M.

Divide into eight powders. (One
to be taken three or four times
a day. In inflammatory cuta-
neous affections; in pertussis
and bronchitis of children.)

242. R. Antimonii tartarati gr. i.

11. EMETICS.

There are two classes of emetics; the one consisting of stimulants
the other of depressants. A certain dose of either class of substances
will excite vomiting. The following formulæ comprise medicines of
both classes;—

243. R. Vini antimonialis f ʒss.

244. R. Vini ipecacuanhæ f ʒss.

245. R. Pulvis ipecacuanhæ gr. xx.
Vini antimonialis f ʒss.
Syrupi rhæados ʒii.
Aquæ menthæ piperitæ
ʒx. M.

246. R. Zinci sulph. gr. xx. to xl.
Aquæ cinnamomi f ʒss. M.

247. R. Cupri sulphatis gr. x.
Aquæ f ʒiss. M.

248. R. Sinapis pulvis ʒss.

Aquæ f ʒiv.

(In cases of poisoning.)

249. R. Ammoniac carbonatis
Pulvis ipecacuanhæ gr. xx.
Tincturæ capsici ʒii.
Aquæ menthæ piperitæ
f ʒii. M.

(When the sensibility of the
stomach is impaired, as in poi-
soning with opium.)

250. R. Tabaci foliorum ʒi.
Aquæ tepidæ q. s.

Bruise the leaves and apply the
poultice to the epigastrium.
(Must be removed as soon as
sickness takes place.)

12. DIAPHORETICS.

There are also two classes of diaphoretics; the one consisting of
stimulants, the other of depressants. Both classes are comprised in
the following formulæ;—

Diaphoretics in the form of Mixture.

251. R. Liquoris ammoniac acetatis
f ʒss.
Aquæ camphoræ f ʒiii.
Syrupi aurantii f ʒss. M.
(Dose, ʒ.)

252. R. Potassæ nitratis ʒss.*
Vini antimonialis f ʒss.
Liq. ammoniac acet f ʒss.
Aquæ menthæ piperitæ
ʒv. M. (ʒ.)

* ʒi. = 100 grains.

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|--|---|
| 253. R. Ammonia carbonatis ℥ss.*
Spiritus chloroformi f ʒss.
Aqua f ʒvss. M. ($\frac{1}{6}$.) | 255. R. Potassæ nitratis ʒss.
Tincturæ opii ʒiss.
Mist. amygd. f ʒvii. M. ($\frac{1}{6}$.) |
| 254. R. Spiritus ætheris nitrosi
f ʒi.
Liquoris ammonia acetatis, ʒiv.
Syrupi hemidesini f ʒi.
Aqua f ʒiv. M. ($\frac{1}{8}$.) | 256. R. Tincturæ guaiaci ammonia
niatæ f ʒi.
Tincturæ opii ʒi.
Aqua pimentæ f ʒvii. M.
($\frac{1}{6}$.) (Chronic rheumatism.) |

Diaphoretics in the form of Powders.

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|---|--|
| 257. R. Pulvis ipecacuanhæ gr. x. | 259. R. Pulvis ipecacuanhæ gr. i.
Pulvis antimonialis gr. x.
Sacchari gr. vi. M. |
| 258. R. Pulvis ipecacuanhæ cum
opio gr. viii.
Antimonii tartarati, gr. ($\frac{1}{6}$) M. | |

13. EXPECTORANTS.

There are also two classes of expectorants; the one stimulant the other depressant. Expectorants of both classes are to be found in the following preparations and formulæ:—

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|---|---|
| 1. Ammoniacum | dose gr. v. to ℥ss.* |
| 2. Ammoniaci mistura | „ f ʒss. — f ʒiss. |
| 3. Antimonium tartaratum | „ gr. $\frac{1}{8}$ — gr. $\frac{1}{4}$. |
| 4. Vinum antimoniale | „ ʒss. — ʒi. |
| 5. Balsamum Peruvianum | „ ʒi. — ʒii. |
| 6. Balsamum toltanum | „ ʒi. — ʒii. |
| 7. Tinctura toltana | „ ʒss. — ʒi. |
| 8. Benzoinum | „ gr. xx. — ℥ss.* |
| 9. Benzoini composita tinctura (Friar's balsam) | „ ʒss. — ʒii. |
| 10. Acidum benzoicum | „ gr. v. — gr. xxx. |
| 11. Galbanum | „ gr. x. — ℥ss.* |
| 12. Ipecacuanhæ pulvis | „ gr. i. — gr. v. |
| 13. Ipecacuanhæ vinum | „ ℥x. — ʒss. |
| 14. Ipecacuanhæ cum opio pulvis | „ gr. ii. — gr. v. |
| 15. Lobelia inflata | „ gr. i. — gr. v. |
| 16. Lobeliæ tinctura | „ ℥x. — ʒi. |
| 17. Lobeliæ æthereæ tinctura | „ ℥x. — ʒi. |
| 18. Senegæ infusum | „ f ʒi. — f ʒii. |
| 19. Senegæ tinctura | „ ʒi. — ʒii. |
| 20. Scillæ pilula composita | „ gr. v. — gr. x. |
| 21. Scillæ syrupus | „ ʒi. — ʒii. |
| 22. Scillæ tinctura | „ ℥x. — ʒss. |

* ʒi. = 100 grains.

Expectorants in the form of Mixture, Draught, or Linctus.

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| <p>260. R. Ammoniae carbonatis gr. xxx.
Spiritus chloroformi ℥iii.
Decocti senegae ℥vss. M. (℥.)</p> <p>261. R. Balsami Peruviani ℥vi.
Glycerini ℥vi.
Misturæ amygdalæ ℥ivss. M. (℥.)</p> <p>262. R. Ammoniae benzoatis.
Ammoniae carbonatis ana gr. xxx.
Vini ipecacuanhæ ℥i.
Decocti Senegæ ℥vi. M. (℥.)</p> <p>263. R. Vini ipecacuanhæ ℥i.
Syrupi papaveris ℥vi.
Spiritus ammoniæ aromatici ℥iii.
Misturæ camphoræ ℥v. M. (℥.)</p> <p>264. R. Syrupi scillæ f ℥ss.
Misturæ ammoniaci f ℥vss. M. (℥.)</p> | <p>265. R. Balsami copaibæ ℥iv.
Vitelli ovi unius. Mix and add gradually
Aquæ cinnamomi ℥ ivss. (℥.)</p> <p>266. R. Decocti senegæ f ℥ivss.
Liquoris ammoniæ acetatis ℥iv.
Syrupi scillæ ℥vi. M. (℥.)</p> <p>267. R. Misturæ ammoniaci f ℥iv.
Tincturæ lobeliæ æthereæ ℥iiss.
Tincturæ camphoræ cum opio f ℥ss.
Syrupi tolutani f ℥i. M. (℥.)</p> <p>268. R. Vini antimonialis f ℥ss.
Liquoris ammoniæ acetatis f ℥ss.
Oxymellis scillæ f ℥i.
Aquæ f ℥vi. M. (℥.)</p> <p>269. R. Vini ipecacuanhæ f ℥ss.
Potassæ bicarbonatis ℥i.*
Aquæ f ℥vss. M. (Dose, $\frac{1}{6}$; with a table-spoonful of lemon-juice.)</p> |
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Expectorants in the form of Pills or Powders.

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| <p>270. R. Antimonii tartarati gr. $\frac{1}{8}$.
Pulvis ipecacuanhæ cum opio gr. viii.
Mucilaginis acaciæ gr. ii. (Make two pills.)</p> <p>271. R. Pilulæ scillæ compositæ.
Extracti conii āā ℥ss.
Make 12 pills. (One two or three times a day.)</p> <p>272. R. Pulvis scillæ.
— ipecacuanhæ āā gr. x.
Extracti conii ℥ss. Make 10 pills. (One three times a day.)</p> | <p>273. R. Pulvis scillæ.
Pulvis ipecacuanhæ.
Extracti stræ ii ana gr. xx. (Make 12 pills.)</p> <p>274. R. Antimonii tartarati gr. iss.
Pulvis ipecacuanhæ gr. xii.
Pulv. glycyrrhizæ ℥i. M. (Divide into twelve powders.)</p> <p>275. R. Pulvis scillæ gr. xx.
Pulvis ipecacuanhæ gr. x.
Pulvis opii gr. ii.
Pulvis glycyrrhizæ ℥i. M. (Divide into ten powders.)</p> |
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* ℥i. = 100 grains.

DEMULCENTS.

1. Acaciæ gummi. Mucilago Acaciæ.
2. Tragacantha. Mucilago tragacanthæ. Pulvis tragacanthæ compositus.
3. Amygdalæ (dulces). Pulvis amygdalæ compositus. Mistura amygdalæ. Oleum amygdalæ. Oleum olivæ. Cetaceum. Manna. Lac.
4. Glycyrrhizæ radix. Pulvis glycyrrhizæ. Extractum glycyrrhizæ.
5. Glycerinum.
6. Lini semen. Infusum lini.
7. Amyli mucilago.
8. Mel.
9. Decoctum hordei, cetrariæ, ulmi.
10. Rosæ caninæ confectio.
11. Syrupus floris aurantii, hemidesmi, mori, rhæados, tolutanus.

Demulcents in the form of Mixture and Draught.

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| 276. R. Cetacei ℥i.*
Vitelli ovi unius.
Syrupi tolutani.
Aquæ cinnam. āā f ℥i.
Aquæ f ℥iv. M. | 279. R. Syrupi hemidesmi ℥ii.
Decocti hordei ℥xviii. M. |
| 277. R. Mannæ optimæ ℥i.*
Infus. lini Oii. M. | 280. R. Decocti cetrariæ ℥xviii.
Syrupi mori ℥ii. M. |
| 278. R. Mucilaginis tragacanthæ.
Lactis vaccini ana ℔b i.
Sacchari ℥i. M. | 281. R. Decocti ulmi ℥xviii.
Confectionis rosæ caninæ
℥ii. M.
282. R. Misturæ amygdalæ ℥xvi.
Glycerini ℥iv. Mix. |

15. EMOLLIENTS.

1. Decoctum papaveris.
2. Cataplasma lini, fermenti.
3. Glycerinum.
4. Oleum amygdalæ, lini, olivæ.
5. Unguentum cetacei, simplicis.
6. Cera alba.
7. Sapo, linimentum saponis, linimentum calcis, emplastrum saponis.

* ℥i. = 100 grains.

16. LAXATIVES, APERIENTS, CATHARTICS, ENEMATA.

1.	Aloe, Barbadosensis	dose gr. v. to gr. x.
2.	„ Enema	„ f ʒx. — ʒxx.
3.	„ Extractum	„ gr. v. — gr. x.
4.	„ Pilula	„ gr. v. — gr. x.
5.	„ Pilula cambogiæ composita . . .	„ gr. v. — gr. x.
6.	„ Pilula colocynthis composita . .	„ gr. v. — gr. x.
7.	„ Pilula colocynthis et hyosciami .	„ gr. v. — gr. x.
9.	„ Socotrina	„ gr. v. — gr. x.
10.	„ Decoctum aloes compositum . . .	„ ʒss. — ʒii.
11.	„ Enema	„ f ʒx. — f ʒxx.
12.	„ Extractum	„ gr. v. — gr. x.
13.	„ Extractum colocynthis compo- positum	„ gr. v. — gr. x.
14.	„ Pilula aloes et assafoetida . . .	„ gr. v. — gr. x.
15.	„ Pilula aloes et myrrhæ	„ gr. v. — gr. x.
16.	„ Pilula rhei composita	„ gr. v. — gr. x.
17.	„ Tinctura aloes	„ f ʒi. — f ʒi.
18.	„ Vinum aloes	„ ʒii. — ʒvi.
19.	Amygdalæ oleum	„ f ʒi. — f ʒii.
20.	Cambogia	„ gr. ii. — gr. v.
21.	Pilula cambogia composita	„ gr. v. — gr. x.
22.	Colocynthis. Extractum colocynthis compositum	} „ gr. v. — gr. x.
23.	Pilula colocynthis composita	
24.	Pilula colocynthis et hyosciami . . .	
25.	Crotonis oleum	„ ʒi. — ʒiii.
26.	Elaterium	„ gr. ʒ — gr. i.
27.	Fel bovinum purificatum	„ gr. v. — gr. x.
28.	Fici pulpa	„ ʒss. — ʒi.
29.	Hydrargyrum: Calomelas	„ gr. i. — gr. x.
30.	Hydrargyrum cum cretâ	„ gr. i. — gr. v.
31.	Pilula calomelanos composita	„ gr. v. — gr. x.
32.	Pilula hydrargyri	„ gr. v. — gr. x.
33.	Jalapæ pulvis	„ gr. v. — gr. xx.
34.	Extractum	„ gr. v. — gr. x.
35.	Pulvis compositus (gr. v. in gr. xv.) .	„ gr. xv. to ʒss.*
36.	Pulvis scammonii compositus (about gr. v. in gr. xv.)	} „ gr. x. to gr. xx.
37.	Resina	
38.	Tinctura	„ gr. v. to gr. x.
39.	Manna	„ ʒi. — ʒii.
40.	Magnesia, et magnesia levis	„ ʒi.* — ʒi.
41.	Magnesia carbonas, et carbonas levis .	„ gr. xx. — ʒss.*
42.	Magnesia sulphas	„ ʒi.* — ʒiv.*

* ʒi. = 100 grains.

43. Magnesiae enema	dose $\bar{\zeta}$ xv.
44. Podophylli pulvis	„ gr. x. to gr. xx.
45. Podophylli resina	„ gr. $\frac{1}{4}$ — gr. ii.
46. Potassæ sulphas	„ $\mathcal{O}$ i.* — $\mathcal{O}$ ii.*
47. Potassæ tartras	„ $\mathcal{O}$ i.* — $\mathcal{O}$ ii.*
48. Potassæ tartras acida	„ $\mathcal{O}$ ss.* — $\mathcal{O}$ ii.*
49. Pruni pulpa	„ $\bar{\zeta}$ ss. — $\bar{\zeta}$ i.
50. Rhei pulvis	„ gr. xv. — $\mathcal{O}$ ss.*
51. Rhei extractum	„ gr. x. — gr. xx.
52. Rhei infusum	„ $\bar{\zeta}$ i. — $\bar{\zeta}$ iv.
53. Rhei pilula composita	„ gr. v. — gr. x.
54. Rhei pulvis compositus	„ gr. xxx. to $\mathcal{O}$ ii.*
55. Rhei tinctura	„ $\bar{\zeta}$ ii. — f $\bar{\zeta}$ i.
56. Ricini oleum	„ $\bar{\zeta}$ ii. — f $\bar{\zeta}$ i.
57. Scammoniae radicis pulvis	„ gr. x. — gr. xx.
58. Scammoniae resina	„ gr. v. to gr. x.
59. Scammonium	„ gr. v. — gr. x.
60. Scammonii confectio	„ gr. xx. — $\mathcal{O}$ ss.*
61. „ mistura	„ f $\bar{\zeta}$ i. — f $\bar{\zeta}$ ii.
62. „ pulvis compositus (gr. iv. in gr. viii.)	„ gr. x. to gr. xx.
63. ———— Extractum colocynthidis compo- situm	„ gr. v. — gr. x.
64. ———— Pilula colocynthidis composita	„ gr. v. — gr. x.
65. ———— Pilula colocynthidis, et hyosciami	„ gr. v. — gr. x.
66. Senna, Alexandrina, et Indica	
67. Sennæ confectio	„ $\mathcal{O}$ ss.* — $\mathcal{O}$ iv.*
68. Sennæ infusum	„ f $\bar{\zeta}$ i. — f $\bar{\zeta}$ ii.
69. Sennæ syrupus	„ f $\bar{\zeta}$ ss. — f $\bar{\zeta}$ i.
70. Sennæ tinctura	„ $\bar{\zeta}$ ss. — f $\bar{\zeta}$ i.
71. Sodæ et potassæ tartras	„ $\mathcal{O}$ i.* — $\mathcal{O}$ iv.
72. Sodii chloridum	„ $\mathcal{O}$ ii.* — $\mathcal{O}$ iv.
73. Sulphur, precipitatum et sublimatum	„ $\mathcal{O}$ ss.* — $\mathcal{O}$ ii.
74. Terebinthinæ oleum	„ f $\bar{\zeta}$ ss. — f $\bar{\zeta}$ ii.
75. Terebinthinæ enema	„ f $\bar{\zeta}$ xvi.

Laxatives, Aperients, Cathartics, in the form of Draught.

283. R. Potassæ tartratis $\mathcal{O}$ i.* Decocti aloes compositi f $\bar{\zeta}$ iss. (For a draught.)	Mucilaginis tragacanthæ $\bar{\zeta}$ i. (One half for a dose.)
284. R. Olei amygdalæ f $\bar{\zeta}$ ii. Olei cinnamomi $\mathfrak{m}$ i. Vitelli ovi unius. Sacchari albi.	285. R. Olei crotonis $\mathfrak{m}$ i. Olei ricini f $\bar{\zeta}$ i. (Mix for a draught.)
Mix well, and add gradually—	286. R. Magnesiae sulphatis $\mathcal{O}$ ii.* Mannæ $\mathcal{O}$ i.* Infusi sennæ f $\bar{\zeta}$ iss. (Mix for a draught.)

* $\mathcal{O}$ i. = 100 grains.

287. R. Pulvis rhei gr. x.
Potassæ tartratis $\frac{3}{4}$ ss.
Infusi sennæ $\frac{3}{4}$ iss.
Tincturæ sennæ $\frac{3}{4}$ ii.
(Mix for a draught.)
288. R. Sodæ et potassæ-tart. $\frac{3}{4}$ ss.
Magnesiæ gr. x.
Aquæ menthæ piperitæ f $\frac{3}{4}$ i.
(Mix for a draught.)
289. R. Magnesiæ carbonatis gr. x.
Magnesiæ sulphatis $\mathcal{O}$ ss.*
Tincturæ zingiberis $\mathfrak{m}$ xv.
Aquæ menthæ piperitæ $\frac{3}{4}$ iss.
(Make a draught.)
290. R. Infusi rhei f $\frac{3}{4}$ iss.
Tincturæ cardamomi compositæ $\frac{3}{4}$ ii.
Magnesia carbonatis gr. x.
(Make a draught.)
291. R. Infusi rosæ acidæ f $\frac{3}{4}$ v.
Magnesiæ sulphatis $\frac{3}{4}$ iss.
Syrupi rosæ f $\frac{3}{4}$ i. M. ($\frac{1}{6}$.)
292. R. Potassæ tartratis $\frac{3}{4}$ i.
Mannæ $\frac{3}{4}$ i.
Aquæ destillatæ f $\frac{3}{4}$ vi. ($\frac{1}{6}$.)
293. R. Olei ricini.
Olei terebinthinæ.
Mucil. acaciæ $\mathfrak{a}\mathfrak{a}$ f $\frac{3}{4}$ ss.
(Mix for a draught.)
294. R. Tincturæ sennæ f $\frac{3}{4}$ ii.
Vini aloes f $\frac{3}{4}$ ii.
Syrupi zingiberis f $\frac{3}{4}$ i.
Aq. menthæ pip. f $\frac{3}{4}$ iii.
M. ($\frac{1}{6}$.)
295. R. Radicis armoraciæ contusæ $\frac{3}{4}$ ii.
Seminis sinapis.
Radicis valerianæ $\mathfrak{a}\mathfrak{a}$ $\mathcal{O}$ i.*
Radicis rhei incisæ $\frac{3}{4}$ ss.
(Infuse in $\mathcal{O}$ iss. of port wine. A wine-glassful as a warm aperient.)
296. R. Olei ricini f $\frac{3}{4}$ iss.
Vitelli ovi unius.
Mix carefully and add—
Aq. menthæ viridis f $\frac{3}{4}$ iv.
Syr. aurantii f $\frac{3}{4}$ i. M. ($\frac{1}{6}$.)

Laxatives, Aperients, Cathartics, in the form of Pills.

297. R. Aloes extracti Barbadosis.
Pulvis zingiberis $\mathfrak{a}\mathfrak{a}$ gr. iiss.
Extracti anthemidis gr. v.
Make two pills. (One or two an hour before dinner, as "dinner-pills.")
298. R. Pilulæ aloes et myrrhæ.
Saponis duri $\mathfrak{a}\mathfrak{a}$ gr. v.
(Make two pills.)
299. R. Extracti aloes Socotrinæ gr. iii.
Saponis duri gr. v.
(Make two pills.)
300. R. Assafœtidæ.
Pulvis rhei $\mathfrak{a}\mathfrak{a}$ gr. v.
Olei anisi $\mathfrak{m}$ ii.
(Make two pills.)
301. R. Pilulæ aloes et myrrhæ gr. vi.
Pulvis capsici gr. ii.
(Make two pills.)
302. R. Extracti colocynthis compositi.
Extracti gentianæ $\mathfrak{a}\mathfrak{a}$ gr. iiss.
(Make a pill.)

* $\mathcal{O}$ i. = 100 grains.

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| <p>303. R. Calomelanos gr. i.
Pulvis rhei.
Saponis duri āā gr. iv.
Olei anethi ℥i.
(Divide into two pills.)</p> <p>304. R. Extracti colocynthis compositi.
Calomelanos āā gr. v.
(Make two pills.)</p> <p>305. R. Resinæ scammonia. Calomelanos.
Ext. colocynthis compositi.
Extracti jalapæ ana gr. iiss.
Olei carui q. s.
(Make two pills.)</p> | <p>306. R. Ext. colocynthis comp.
Resinæ jalapæ.
Gambogia ana gr. iiss.
Resinæ podophylli gr. $\frac{1}{4}$.
Olei juniperi q.s.
(Make two pills.)</p> <p>307. R. Olei tigllii ℥i.
Pulvis aloes q.s. M.</p> <p>308. R. Resinæ podophylli gr. i.
Extracti anthemidis gr. viii.
(Make two pills.)</p> <p>309. R. Pilulæ hydrargyri gr. iii.
Extracti colocynthis compositi gr. vii.
(Make two pills.)</p> |
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Laxatives, &c., in the form of Powder.

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| <p>310. R. Pulvis. rhei gr. xx:
Potassæ bitartratis ℥ss.*
Pulvis aromaticæ gr. v. M.</p> <p>311. R. Pulvis rhei gr. x.
Calomelanos gr. iii.
Pulveris aromatici gr. v.
M.</p> | <p>312. R. Pulvis scammonia co. gr. x.
Calomelanos gr. v. M.</p> <p>313. R. Extracti elaterii gr. ii.
Sacchari ℥ss.* M.
Eight powders. (One every quarter of an hour till the bowels act.)</p> |
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Laxatives, &c., in the form of Electuary.

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| <p>314. R. Sulphuris precipitati.
Potassæ tartratis acidæ āā ℥i.
Pulvis aromatici ℥i.*
Mellis vel theriacæ, q. s.
(A tea-spoonful or dessert-spoonful two or three times a day.)</p> | <p>315. R. Pulpæ cassia. Confectionis sennæ.
Potassæ bitartratis āā ℥i.
Pulvis piperis nigri ℥ss.*
Theriacæ, q. s. M.
(A dessert-spoonful two or three times a day, in hæmorrhoids.)</p> |
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PURGATIVE ENEMATA.

1. Enema aloes.
2. Enema magnesiæ sulphatis.
3. Enema terebinthina.
4. Enema assafoetida.

* ℥i. = 100 grains.

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| <p>316. R. Infusi anthemidis f $\bar{z}$x.
Sodæ sulphatis $\bar{z}$i. M.</p> <p>317. R. Extracti colocynthis co.
Oss.*
Infusi sennæ f $\bar{z}$xii. M.</p> <p>318. R. Extracti aloes Socotrinæ
Oss.*
Lactis communis f $\bar{z}$vi. M.</p> | <p>319. R. Decocti, hordei f $\bar{z}$x.
Olei ricini f $\bar{z}$i.</p> <p>320. R. Sodii chloridi $\bar{z}$ii.
Decocti hordei Oi. M.</p> <p>321. R. Olei ricini f $\bar{z}$iii.
Potassæ carbonatis gr. xx.
Saponis Oss.*
Aquæ ferventis Oi. M.</p> |
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17. DIURETICS.

(a) Saline.

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| 1. Ammoniæ acetatis liquor . . . | dose f m̄x. to $\bar{z}$ i. |
| 2. Ammoniæ benzoas | „ gr. x. — gr. xx. |
| 3. Lithiæ carbonas | „ gr. v. — gr. x. |
| 4. Lithiæ citras | „ gr. v. — gr. xv. |
| 5. Potassæ carbonas | „ gr. x. — |
| 6. Potassæ acetas | „ gr. x. — |
| 7. Potassæ bicarbonas | „ gr. x. — |
| 8. Potassæ chloras | „ gr. x. — gr. xx. |
| 9. Potassæ citras | „ gr. xxx. — $\bar{z}$ i.* |
| 10. Potassæ liquor. | „ m̄ x. — m̄ xxx. |
| 11. Potassæ nitras | „ gr. x. — Oss.* |
| 12. Potassæ tartras acida | „ gr. xxx. — $\bar{z}$ i.* |
| 13. Potassæ tartras | „ gr. xxx. — $\bar{z}$ i.* |
| 14. Sodæ liquor | „ m̄ x. — m̄ xxx. |
| 15. Sodæ acetas | „ gr. xxx. — $\bar{z}$ i.* |
| 16. Sodæ bicarbonas | „ gr. x. — Oss.* |
| 17. Sodæ et potassæ tartras | „ gr. xxx. — $\bar{z}$ ii.* |

(b) Vegetable.

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| 18. Ætheris nitrosi spiritus . . . | „ $\bar{z}$ ss. — $\bar{z}$ ii. |
| 19. Armoraciæ spiritus compositus . | „ f $\bar{z}$ ss. — f $\bar{z}$ i. |
| 20. Bucco infusum | „ f $\bar{z}$ i. — f $\bar{z}$ ii. |
| 21. Bucco tinctura | „ $\bar{z}$ ss. — $\bar{z}$ ij. |
| 22. Copaiba | „ m̄xx. — $\bar{z}$ ss. |
| 23. Copaibæ oleum | „ m̄iii. — m̄xx. |
| 24. Cubebæ pulvis | „ gr. xx. — Oss.* |
| 25. Cubebæ oleum | „ m̄iii. — m̄xx. |
| 26. Digitalinum | „ gr. $\frac{1}{40}$. — gr. $\frac{1}{10}$. |
| 27. Digitalis pulvis | „ gr. i. — gr. iii. |
| 28. Digitalis infusum | „ $\bar{z}$ ii. — f $\bar{z}$ ss. |

* $\bar{z}$ i. = 100 grains.

29. Digitalis tinctura	dose	{ m x. cautiously increased to m xl.
30. Juniperi oleum	„	miv. to mvi.
31. Juniperi spiritus	„	zi. — f zss.
32. Pareiræ decoctum	„	f zi. — f zii.
33. „ extractum liquidum	„	zss. — zii.
34. Sabinæ pulvis	„	gr. iv. — gr. x.
35. Sabinæ oleum	„	mi. — miii.
36. Sabinæ tinctura	„	mxx. — zi.
37. Sapo durus et mollis	„	gr. x. — gr. xx.
38. Scillæ pulvis	„	gr. v. — gr. xx.
39. Scillæ syrupus	„	zi. — zii.
40. Scillæ tinctura	„	mxxv. — zi.
41. Scillæ pilula composita	„	gr. v. — gr. x.
42. Scoparii succus	„	zss. — zij.
43. Senegæ decoctum	„	f zi. — f zii.
44. Taraxaci decoctum	„	f zi. — f zii.
45. Taraxaci extractum	„	gr. x. — gr. xxx.
46. Taraxaci succus	„	zi. — ziv.
47. Terebinthi Canadensis	„	gr. x. — gr. xl.
48. Terebinthinæ oleum	„	zss. — zii.
50. Terebinthinæ confectio	„	zss.* — zi.*
51. Uvæ ursi infusum	„	f zi. — f zii.

(c) *Animal.*

52. Cantharidis tinctura „ m v. — m x.

Diuretics in the form of Mixture, Draught, &c.

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| <p>322. R. Ammonię benzoatis zss.*
Ext. pareiræ liquidi zvi.
Decocti pareiræ f z v. M.
($\frac{1}{6}$.)</p> <p>323. R. Lithiæ citratis gr. x.
Acidi citrici gr. xx.
Syrupi aurantii zss.
Aquæ f zii.</p> <p>To be taken in a state of effervescence with gr. xiv. bicarbonate of soda dissolved in f zii. water.</p> <p>324. R. Potassæ nitratis zss.*
Potassæ bicarbonatis zi.*
Spiritus juniperi compositi f zss.
Infusi bucco z vss. M. ($\frac{1}{6}$.)</p> | <p>325. R. Potassæ nitratis zss.
Dissolve in a quart of lemonade for a common drink.</p> <p>326. R. Potassæ acetatis zss.*
Infusi digitalis f zii.
Spiritus ætheris nitrosi f zi.
Decocti taraxaci f ziii.</p> <p>327. R. Potassæ acetatis zss. — zi.
Syrupi simplicis f ziii.
Spiritus ætheris nitrosi f zi. M.
(A teaspoonful for a dose.)</p> |
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* zi. = 100 grains.

328. R. Potassæ tartratis acidæ ʒss.
Corticis limonis et sacchari q. s.
Aquæ ferventis Oii.
(For a common drink.)
329. R. Sodæ et potassæ tartratis Oii.*
Spiritus juniperi compositi ʒvi.
Succi scoparii ʒiii.
Decocti taraxaci $\text{ʒv. M.} (\frac{1}{8}).$
330. R. Copaibæ f ʒss.
Vitelli unius ovi.
Sacchari ʒi.
Mix carefully, and add—
Aquæ menthæ virid. f ʒvi.
(Three table-spoonfuls three or four times a day.)
331. R. Infusi bucco f ʒvii.
Spiritus juniperi c. f ʒi.
M. $(\frac{1}{8}).$
332. R. Juniperi baccæ contritæ ʒii.
Seminis anisi contusi Oii.*
333. R. Taraxaci succi.
Spiritus juniperi ana ʒvi.
Tincturæ scillæ ʒiii.
Decocti scoparii $\text{ʒiv. M.} (\frac{1}{8}).$
334. R. Sabinæ tincturæ ʒiii.
Infusi bucco $\text{ʒvss. M.} (\frac{1}{8}).$
335. R. Decocti pareiræ f ʒviii.
Acidi nitrici diluti m xl.
Tincturæ hyoscyami ʒii.
M. $(\frac{1}{8}).$
336. R. Tincturæ cantharidis ʒi.
Spiritus juniperi ʒvi.
Decocti pareiræ $\text{ʒv M.} (\frac{1}{8}).$
337. R. Tincturæ seminis colchici f ʒss.
Potassæ acetatis ʒss.
Aquæ fœniculi f ʒvii.
Spiritus juniperi co. f ʒss
M. $(\frac{1}{8}).$

Diuretics in the form of Pill, Powder, &c.

338. R. Pilulæ scillæ compositæ Oii.*
Calomclanos gr. v.
Olei juniperi m x.
Make twenty-four pills.
339. R. Pulvis digitalis gr. i.—ii.
Hydrargyri pilulæ gr. ii.
Pilulæ scillæ co. gr. vi. M.
(Divide into two pills.)
340. R. Digitalini gr. $\frac{1}{30}.$
Pulvis scillæ.
Extracti taraxaci ana gr. v.
Make two pills.
341. R. Potassæ nitratis gr. x.
Potassæ tart. acidæ gr. xx.
- Pulvis acaciæ gr. x.
Sacchari ʒss.
(Make a powder, to be taken three times a day in barley-water.)
342. R. Olei cubebæ m xx.
Saponis duri.
Pulvis cubebæ ana gr. xx.
(Make ten pills.)
343. R. Terebinthinæ Canadensis gr. v.
Olei cubebæ, m i.
Pulvis glycyrrhizæ, q. s.
(Make a bolus.)

* Oii. = 100 grains.

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| 344. R. Extracti taraxaci, $\bar{z}$ ss.
Pulvis scillæ, gr. xl.
Confectionis terebinthinæ,
$\bar{z}$ ss. | Succi taraxaci, q. s.
(Make an electuary. A teaspoon-
ful for a dose.) |
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18. ANTHELMINTICS.

Preparations of the London Pharmacopœia.

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| 1. Cusso infusum dose f $\bar{z}$ iv. to f $\bar{z}$ viii.
2. Filicis maris pulvis „ gr. xx. — $\bar{z}$ i.*
3. Filicis extractum liquidum „ $\bar{z}$ i. — $\bar{z}$ iii.
4. Granati corticis pulvis „ gr. xx. — $\bar{z}$ i.*
5. Granati corticis decoctum „ f $\bar{z}$ ii. — $\bar{z}$ x.
7. Mucuna pruriens (non-official) „ gr. xx to $\bar{z}$ ss.
8. Kemela „ $\bar{z}$ ss.* — $\bar{z}$ iss.*
9. Santoninum „ gr. i. — gr. vi.
10. Spigeliæ Marylandicæ radicis pulv.
(non-official) „ $\bar{z}$ ss.* — $\bar{z}$ i.*
11. Pulvis scammonii compositus „ gr. v. — gr. xx.
12. Terebinthinæ oleum „ $\bar{z}$ ss. — $\bar{z}$ ii.
13. Calcis liquor enema „ f $\bar{z}$ ii. — f $\bar{z}$ iv.
14. Quassia enema „ f $\bar{z}$ ii. — f $\bar{z}$ iv. | 345. R. Olei terebinthinæ f $\bar{z}$ i.
Decocti hordei f $\bar{z}$ i. M.
346. R. Mucunæ pruriensis $\bar{z}$ i.*
Theriaca $\bar{z}$ i. M.
(A tea-spoonful for a dose.
Against lumbrici and ascarides.)
347. R. Extracti filicis liquidi $\bar{z}$ i.
Pulvis tragacanthæ com-
positi $\bar{z}$ ss.* . | Aqua menthæ piperitæ
f $\bar{z}$ ii.
(Make a draught.)
348. R. Santonini gr. ii.
Pulvis scammonii compe-
siti gr. viii.
(Make a powder.) |
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19. EMMENAGOGUES.

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| 1. Rutæ oleum dose $\mathfrak{m}$ ii. to $\mathfrak{m}$ v.
2. Sabinæ oleum „ $\mathfrak{m}$ i. — $\mathfrak{m}$ v.
3. Sabinæ tincturæ „ $\mathfrak{m}$ x. — $\bar{z}$ i. |
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For the other remedies of this class, see Tonics, especially those containing steel, myrrh, and aloes.

* $\bar{z}$ i. = 100 grains.

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| <p>349. R. Ferri et ammoniæ citra-
tis gr. xxx.
Tincturæ sabinæ ℥ii.
Aqua cinnamomi f ℥vi. M.
(℥.)</p> <p>350. R. Olei rutæ ℥iv.
Pulvis myrrhæ gr. iv.</p> | <p>Pulvis aloes gr. ii.
(Make two pills.)</p> <p>351. R. Olei sabinæ ℥iv.
Pulvis myrrhæ gr. v.
Saponis mollis q. s.
(Make two pills.)</p> |
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20. ANTACIDS.

1. Ammoniæ liquor, acetas, carbonas, benzoas, phosphas.
 2. Ammoniæ spiritus aromaticus.
 3. Guaiaci tinctura ammoniata.
 4. Valerianæ tinctura ammoniata.
 5. Calcis liquor, liquor saccharatus; calx carbonas precipitata, chlorinata; creta preparata.
 6. ——— Mistura cretæ.
 7. ——— Pulvis cretæ aromaticus.
 8. ——— Pulvis creta aromaticus cum opio.
 9. Lithiæ, carbonas, citras.
 10. Potassæ liquor, acetas. carbonas, bicarbonas, citras, tartras, tartras acida.
 11. Sodæ, liquor, carbonas, carbonas exsiccata, bicarbonas, sodæ et potassæ tartras.
 12. Magnesia, magnesiæ levis, magnesiæ carbonas, carbonas levis.
 13. Pulvis rhei compositus.
 14. Sapo mollis, durus.
- (For formulæ, see Diuretics, &c.)

21. ANTISEPTICS AND DISINFECTANTS.

1. Calcis chlorinatæ liquor.
2. Carbo.
3. Carbo animalis.
4. Cataplasma carbonis, fermenti, sodæ chlorinatæ.
5. Liquor chlorinii.
6. Liquor sodæ chlorinatæ.
7. Potassæ permanganatis liquor.
8. Sodæ chlorinatæ, liquor.
9. Zinci chloridum.

22. ALTERATIVES.

1. Acidum nitro-muriaticum dilutum; acidum arseniosum (dose $\frac{1}{20}$ to $\frac{1}{10}$ gr.); liquor arsenicalis (dose $\mathfrak{m}$ ii. to $\mathfrak{m}$ x.); liquor sodæ arseniatis (dose $\mathfrak{m}$ v. to $\mathfrak{m}$ xx.).
2. Antimonium sulphuratum; antimonium tartaratum; vinum antimoniale (gr. $\frac{1}{4}$ in $\mathfrak{z}$ i.); antimonii oxidum (dose gr. i to gr. v.); pulvis antimonialis gr. v. to x.
3. Brominium (dose $\frac{1}{2}$ to gr. ii.).
4. Potassii bromidi (dose gr. iii. to gr. xv.).
5. Conii tinctura, cataplasma, extractum, succus.
6. Dulcamaræ infusum.
7. Hemidesmi syrupus.
8. Hydrargyrum ammoniatum, cum cretâ, corrosivum sublimatum (dose gr. $\frac{1}{16}$ to gr. $\frac{1}{4}$).
9. Hydrargyri iodidum rubrum (dose gr. $\frac{1}{2}$ to gr. ii.), iodidum viride (dose gr. ii. to gr. v.), oxidum rubrum, pilula, linimentum, unguentum, unguentum hydrargyri ammoniati, unguentum hydrargyri iodidi rubri, unguentum hydrargyri nitratis, unguentum hydrargyri oxidi rubri, liquor hydrargyri nitratis acidus, hydrargyri emplastrum, emplastrum ammoniaci cum hydrargyro. Calomelas (dose gr. $\frac{1}{4}$ to gr. ii.), pilula calomelanos composita, unguentum calomelanos.
10. Iodinii tinctura (dose $\mathfrak{m}$ v. to $\mathfrak{m}$ xxx.), linimentum, unguentum compositum, linimentum.
11. Potassii iodidi (gr. i. to gr. x.), emplastrum, unguentum, unguentum iodinii compositum, tinctura iodinii, linimentum iodinii.
12. Ferri iodidum (gr. i. to gr. x.), syrupus ferri iodidi (gr. v. in $\mathfrak{z}$ i.), pilula ferri iodidi (dose gr. v. to gr. x.).
13. Morrhuæ oleum.
14. Sarsæ decoctum; decoctum compositum; extractum liquidum.

Alteratives in the form of Mixture or Draught.

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| <p>352. R. Hydrargyri corrosivi sublimati gr. i.
Tincturæ cinchonæ f $\mathfrak{z}$ii. M.
(A tea-spoonful for a dose.)</p> <p>353. R. Potassii iodidi gr. xxx.
Inf. quassiae f $\mathfrak{z}$vi. M. ($\frac{1}{6}$.)</p> <p>354. R. Tincturæ iodinii compositæ $\mathfrak{z}$i.
Aquæ destill. f $\mathfrak{z}$vi. M. ($\frac{1}{6}$.)</p> | <p>355. R. Ferri iodidi gr. xx.
Spiritus Myristicæ $\mathfrak{z}$i.
Infusi quassiae f $\mathfrak{z}$v. M. ($\frac{1}{6}$.)</p> <p>356. R. Extracti sarsæ $\mathfrak{z}$ss.
Decocti sarsæ Oi. M.
(A wine-glassful for a dose.)</p> <p>357. R. Decocti sarsæ compositi f $\mathfrak{z}$viiiss.
Acidi nitrici hydrochlorici diluti $\mathfrak{z}$iv.
Tincturæ conii $\mathfrak{z}$ii. M. ($\frac{1}{8}$.)</p> |
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| <p>358. R. Liqueur arsenicalis ℥ss.
 Infusi quassie f ℥v.
 Tincturæ lupuli f ℥i. M.
 (½.)</p> <p>359. R. Liqueur sodæ arseniatis
 ℥xxx.
 Sodæ bicarbonatis ℥ss.*</p> | <p>Tincturæ conii ℥iii.
 Infusi dulcamaræ f ℥vi.
 M. (⅙.)</p> <p>360. R. Potassii bromidi gr. xx.
 Syrupi tolutani f ℥i.
 Aquæ destillatæ f ℥vii. M.
 (Dose, ⅙.)</p> |
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Alteratives in the form of Pill.

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| <p>361. R. Calomelanos gr. i.
 Extracti conii gr. iii.
 (Make a pill.)</p> <p>362. R. Hydrargyri iodidi rubri
 gr. i.
 Extracti conii gr. v.
 (Make two pills.)</p> | <p>363. R. Hydrargyri iodidi viridis
 gr. iv.
 Extracti conii gr. v.
 (Make two pills.)</p> <p>364. R. Ferri iodidi ℥ss.
 Extracti gentianæ ℥iss.
 (Make twenty-four pills.)</p> |
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Alteratives in the form of Powder.

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| <p>365. R. Hydrarg. c. cretâ gr. xx.
 Antimonii tartarati gr. i.
 Sacchari ℥ss.*
 (Make ten powders.)</p> <p>366. R. Calomelanos gr. iii.
 Pulvis opii gr. i.</p> | <p>Pulvis glycyrrhizæ ℥ss.
 (Divide into twelve powders.)</p> <p>367. R. Hydrarg. c. cretâ gr. xx.
 Sacchari albi ℥ss.*
 (Make ten powders.)</p> |
|---|--|

* ℥i. = 100 grains.

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 Amaurosis, *is*, *f.* Blindness (*ἀμαυρός*, obscure), 681.
 Amenorrhœa, *α*, *f.* (*α*, priv., *μῆν*, a month, *ρέω*, to flow), 634.
 Anæmia, *α*, *f.* Want of blood (*α*, priv. *αἷμα*, blood), 284.
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 Anasarca, *α*, *f.* (*ἀνὰ*, through, *σὰρξ*, the flesh), 299.
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 Angina, *α*, *f.* Choking (*ἄγχω*, to throttle), 474.
 Anuria, *α*, *f.* Suppression of urine (*α*, priv., *οὐρέω*, to pass urine), 626.
 Aphonia, *α*, *f.* Loss of voice (*α*, priv., *φωνή*, sound), 504.
 Aphtha, *α*, *f.* Thrush (*αφθα*, fr. *ἄπτω*, to inflame), 547.
 Apnœa, *α*, *f.* Breathlessness (*α*, priv., *πνέω*, to breathe), 35.
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 Ascaris, *idis*, *f.* (*ἄσκαρις*, fr. *ἄσκαρίζω*, to jump), 725.
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 Asthenia. (*α*, priv. *σθένος*, strength), 321.
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- Catalepsy, *Catalepsis*. (καταληψις, εως, η, fr. κατὰλαμβάνω, to seize), 455.
- Catamenia, *orum*, pl. n. (κατα, according to, μην, the month), 634.
- Catarrhus, *i*, m. A cold (κατὰ, down, ῥέω, to flow), 510.
- Cephalalgia, *a*, f. Headache (κεφαλή, the head, ἄλγος, pain), 404.
- Cheloida, *a*, f. A cutaneous disease (χέλυσ, a tortoise, εἶδος, likeness), 719.
- Chloasma, *ātis*, n. (χλοάζω, to be green), 691.
- Chlorosis, *is*, f. Green sickness (χλωρός, green), 288.
- Cholera, *a*, f. (χολή, bile, ῥέω, to flow), 586.
- Chorea, *a*, f. (χορεία, a dancing), 455.
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- Chronic, *Chronicus*, *a*, um. (χρόνος, time.)
- Clonic, *Clonicus*, *a*, um, (χλόνος, commotion), 110, 225.
- Colica, *a*, f. (κῶλον, the colon), 582.
- Coma, *ātis*, n. Complete loss of sensation and voluntary motion, (κῶμα, ατος, το, deep sleep), 226, 441.
- Congestion. Fulness of blood (*congestio*, fr. *congero*, to heap up), 297.
- Corneitis, *īdis*, f., and *Cornica*, *a*, f. (*cornu*, a horn, *itis*), 666.
- Cyanosis, *is*, f. Blue disease (κύανος, blue), 491.
- Cystitis, *īdis*, f. (κύστις, a bladder, *itis*), 631.
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- Diabetes, *is*, m. (διά, through, βαίνω, to pass), 627.
- Diarrhœa, *a*, f. (διά, through, ῥέω, to flow), 578.
- Diphtheria, *a*, f. (διφθερώω, to cover with skin), 360.
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- Dyspepsia, *a*, f. (δύς, difficult, πέπτω, to concoct), 564.
- Dysphonia, *a*, f. (δύς, difficult, φωνή, voice), 557.
- Dyspnœa, *a*, f. (δύς, with difficulty, πνέω, to breathe), 205.
- Dysuria, *a*, f. (δύς, with difficulty, οὐρέω, to pass urine), 633.
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- Eczema, *ātis*, n. Running scab (ἐκξέω, to boil up), 702.
- Electrode. (ἤλεκτρον, amber, ὁδός, a way), 443.
- Elephantiasis, *is*, f. (ἐλεφαντίασις, fr. ελεφας, an elephant), 717.
- Embolism, *Embolismus*, *i*, m. (fr. ἐμβαλλω, to drive in), 497.
- Embolism, *Embolismus*, *i*, m. (ἐμφύσημα, fr. ἐμφυσάω, to inflate), 521.
- Emphysema, *ātis*, n. Pus (ἐν, within, πύον, pus), 542.
- Empyema, *ātis*, n. Pus (ἐν, within, πύον, pus), 542.
- Emunctory, *Emunctorium*, *i*, n. (fr. *emungo*, to carry off), 78.
- Encephalitis, *īdis*, f. (ἐν, in, κεφαλή, head, *itis*), 408.
- Endemic. Indigenous (ἐν, among, δῆμος, a people; or ἐν, in, δῆμος a district), 331, 623, 630.
- Endocarditis, *īdis*, f. (ἐνδον, within, καρδία, the heart, *itis*), 482.

- Enteritis, *idis, f.* (ἐντέρον, the bowels, *itis*), 573.
- Entozoa, *pl., Entozoon, i, n.* (ἐντός, within, ζῶον, an animal), 723.
- Enuresis, *is, f.* Incontinence of urine (ἐν, in, οὐρέω, to pass urine), 632.
- Ephelis, *idis, f.* Freckles (ἐφηλῖς, fr. ἐπὶ and ἥλιος, the sun), 720.
- Epidermmycosis, *is, f.*, contraction for epidermato-mycosis. (fr. ἐπι-
δερμῖς, the cuticle, μύκης, a fungus), 691.
- Epidemic. Prevalent (ἐπι, among, δῆμος, a people), 511, 586.
- Epilepsy. Falling sickness (ἐπίλεψις; ἐπίλαμβάνω, to seize upon),
451.
- Equinia, *α, f.* Glanders (*equus*, a horse), 380.
- Erysipelas, *ātis, n.* (ἐρυσίπτελας, fr. ἐρύω, to draw, πέλας, near), 302.
- Erythema, *ātis, n.* Inflammatory blush (ἐρύθαινω, to redden), 699.
- Exanthemata, *pl., Exanthema, ātis, n.* (ἐξανθέω, to break out into
red spots), 339.
- Febricula, *α, f.* (dim. of *febris*), 293.
- Febris, *is, f.* (*ferveo*, to be hot.)
- Frambæsia, *α, f.* The yaws (*framboise*, Fr., a raspberry), 718.
- Gangræna, *α, f.* (γάγγραινα, fr. γράω, to eat), 75.
- Gastralgia, *α, f.* Pain in the stomach (γαστήρ, the stomach, ἄλγος,
pain), 565.
- Gastritis, *idis, f.* (γαστήρ, the stomach, *itis*), 563.
- Gastrodynia. (γαστήρ, the stomach, ὀδύνη, pain, *itis*), 565.
- Gastro-enteritis, *idis, f.* (γαστήρ, the stomach, ἐντέρον, the bowels,
itis), 586.
- Glaucoma, *atis, n.* (fr. γλαυκός, sea-green), 679.
- Gingivitis, *idis, f.* (gingivæ, the gums, *itis*), 553.
- Glossitis, *idis, f.* (γλωσσα, the tongue, *itis*), 554.
- Gonorrhœa, *α, f.* (γονή, seed, ῥέω, to flow), 651.
- Hæmatemesis, *is, f.* (αἷμα, blood, ἔμεσις, vomiting), 562.
- Hæmaturia, *α, f.* Bloody urine (αἷμα, blood, οὐρέω, to void urine),
148, 622.
- Hæmoptysis, *is, f.* Spitting of blood (αἷμα, blood, πτύσις, spitting),
219, 529.
- Hæmorrhage. Bleeding (αἷμα, blood, ῥήγνυμι, to burst forth), 298.
- Hæmorrhoids, *idis, f.* (αἷμα, blood, ῥέω, to flow), 585.
- Hectic. A remittent fever (ἐκτικτός, habitual), 367.
- Hemiplegia, *α, f.* Palsy of one side (ἥμις, half, πλῆσσω, to strike),
412, 426.
- Hepatitis, *idis, f.* (ἥπαρ, ἥπατος, the liver, *itis*), 597.
- Herpes, *etis, m.* Tetters (ἐρπω, to creep), 704.
- Homologous. (ὁμός, like, λόγος, condition.)
- Hydatid. (ὕδατις. ἰδος, η, a small bladder, fr. ὕδωρ), 491, 609.
- Hydrocephalus, *i, m.* (ὕδωρ, water, κεφαλῇ, head), 415.
- Hydropericardium, *i, n.* (ὕδωρ, water, περὶ, around, καρδιά, the
heart), 481.
- Hydrophobia, *α, f.* Canine madness (ὕδωρ, water, φόβος, fear), 463.

- Hydrops, *ōpis*, *m.* (fr. ὕδωρ, water), 299.
- Hydrorachis, *eos*, *f.* (ὕδωρ, water, ῥάχis, the spine), 432.
- Hydrothorax, *ācis*, *f.* (ὕδωρ, water, θώραξ, the chest), 542.
- Hyperæmia. (ὑπερ, excess, αἷμα, blood), 283.
- Hyperæsthesia. (ὑπερ, excess, αἴσθησις, sensation), 427.
- Hypertrophy. (ὑπερ, over, τροφή, nourishment), 91.
- Hypochondriasis, *is*, *m.* Low spirits (ὑπὸ, under, χόνδρος, cartilage), 131.
- Hysteralgia, *æ*, *f.* (ὑστέρα, the womb, ἄλγος, pain.)
- Hysteria, *æ*, *f.* Hysterics (ὑστέρα, the womb), 457.
- Hysteritis, *idis*, *f.* (ὑστέρα, the womb, *itis*), 376, 640.
- Icterus, *i*, *m.* Jaundice (ἵκτερος, a yellow bird), 604.
- Idiosyncrasy (ἴδιος, peculiar, συν, with, κρασις, temperament), 6.
- Ichthyosis, *is*, *f.* Fish-skin (ἰχθυα, the scale of a fish), 716.
- Impetigo, *inis*, *f.* Running tetter (Lat. *impetigo*, fr. *impeto*, to assail), 709.
- Inflammation. (Lat. *inflammatio*, fr. *in* and *flamma*), 71.
- Influenza, *æ*, *f.* Epidemic catarrh (fr. *influo*, to abound), 511.
- Intus-susceptio, *ōnis*, *f.* (*intus*, within, and *susceptio*, a taking), 581.
- Iritis, *idis*, *f.* (*iris*, a rainbow, *itis*), 667.
- Ischuria, *æ*, *f.* Suppression of urine, (ἰσχυρία, fr. ἴσχω, to restrain, ουρον, urine), 626.
- Itis. (ἴημι, to urge against, thus denoting violent action, and used as a terminal to indicate *inflammation*.)
- Kyestein. (κύησις, εως, ἡ, pregnancy, ἐσθής, ἦτος, ἡ, a covering), 147.
- Laryngismus, *i*, *m.*, (λάρυγγίζω, to vociferate), 509.
- Laryngitis, *idis*, *f.* (λάρυγξ, the larynx, *itis*), 501.
- Lepra. A cutaneous disease (λεπρὸς, scaly), 713.
- Leucocythemia, *æ*, *f.* (λευκὸς, white, κύτος, a cell, and αἷμα, blood), 290.
- Leucorrhœa, *æ*, *f.* The whites (λευκὸς, white, ῥέω, to flow), 638.
- Lichen, *ēnis*, *n.* A cutaneous disease (λειχήν, a lichen), 712.
- Lumbago, *inis*, *f.* (*lumbus*, the loins), 398.
- Lumbricus, *i*, *m.* (*Ascaris lumbricoides*) round worm, (*lubricus*, slippery), 723.
- Lupus, *i*, *m.* (*lupus*, a wolf), 720.
- Mania, *æ*, *f.* (μαίνομαι, to be furious), 129, 465.
- Marasmus, *i*, *m.* Atrophy (μαραίνω, to wither).
- Melancholia, *æ*, *f.* (μέλαινα, black, χολή, bile), 132, 468.
- Melæna, *æ*, *f.* Hæmorrhage from the bowels (μέλαινα, black), 579.
- Melanosis, *is*, *f.* A morbid product of a black colour (μέλας, μέλανος, black), 97.
- Melasma, *ātis*, *n.* (fr. μέλας, black), 291.
- Meningitis, *idis*, *f.* (μηνιγξ, a membrane, *itis*), 414.

- Menorrhagia, *α, f.* Flooding (μήν, a month, ῥήγνυμι, to break forth), 637.
- Mentagra, *α, f.* (*mentum*, the chin, ἄγρα, seizure), 694.
- Metritis, *ιδίς, f.* Inflammation of the womb (μήτρα, the womb, *itis*), 640.
- Miliaria, *α, f.* Miliary fever (*milium*, a millet seed), 705.
- Mimōsis, *is, f.* (μῖμος, a mimic), 292.
- Mollities, *ει, f.* (Softening, fr. *mollis*, soft), 388.
- Molluscum, *ι, n.* (*molluscum*, the bunch of the tree acer), 718.
- Myelitis, *ιδίς, f.* Inflammation of the spinal cord (μυελὸς, marrow, *itis*), 427.
- Nephritis, *ιδίς, f.* (νεφρὸς, the kidney, *itis*), 612.
- Neuralgia, *α, f.* (νεῦρον, a nerve, ἄλγος, pain), 433.
- Noseraesthesia. Morbid sensation (νοσηρὸς, unhealthy, αἴσθησις, sensation), 111.
- Œdēma, *αῖτις, n.* (οἰδέω, to swell), 299.
- Œsophagitis, *ιδίς, f.* (οἶσω, to carry, φάγω, to eat, *itis*), 559.
- Oophoritis, *Οόφθουρον, ι, n.*, an ovary (ὠδον, an egg, φέρω, to bear, *itis*), 648.
- Ophthalmia, *α, f.* Inflammation of the eye (ὀφθαλμὸς, the eye), 660.
- Osteo-malacia, *α, f.* (ὀστέον, a bone, μαλακία, softness), 388.
- Otitis, *ιδίς, f.* (οὖς, ὠτὸς, the ear, *itis*), 683.
- Palpitatio *ὄνις, f.* (*palpito*, to throb), 472.
- Paracentesis *is, f.* Tapping (παρὰ, through, κεντέω, to pierce), 418.
- Paralysis, *is, f.* Palsy (παράλυνω, to relax), 225, 419, 427.
- Paraplegia, *α, f.* Palsy of the lower half of the body (παρὰπλήσσω, to strike), 426, 441.
- Parotitis, *ιδίς, f.* (παρὰ, near, ὠτὸς, of the ear), 558.
- Pellagra, *α, f.* (*pellis agria*, wild skin; or φελλὸς, the bark of the cork-tree, and ἄγριος, wild), 715.
- Pemphigus, *ι, m.* (πέμφιγος, of a small blister), 707.
- Pericarditis, *ιδίς, f.* (περὶ, around, καρδία, the heart, *itis*), 478.
- Peritonitis, *ιδίς, f.* (περιτόναιον, fr. περὶ, around, τείνω, to extend, *itis*), 591.
- Pertussis, *is, f.* Whooping-cough (*pertussis*, a continual cough), 523.
- Pestis, *is, f.* The plague (Lat. *pestis*), 364.
- Phlebitis, *ιδίς, f.* Inflammation of the veins (φλέψ, φλεβὸς, a vein), 498.
- Phlegmasia, *α, f.* (φλέγμα, a burning, fr. φλέγω, to burn), 499.
- Phlegmon. *phlegmōnē, es, f.* (fr. φλέγω, to burn), 40.
- Phlogosis, *is, f.* (φλόγωσις, a burning, φλογώω, to inflame), 294.
- Phrenitis, *ιδίς, f.* (φρήν, φρενὸς, the mind, *itis*), 408.
- Phthisis, *is, f.* Consumption (φθίσις, fr. φθίω, to consume), 531.
- Pityriasis, *is, f.* Dandriff (πίτυρον, bran), 716.
- Plethora. Fulness of blood (πληθώρα, fulness), 283.

- Pleuritis, *īdis*, *f.* Inflammation of the pleura (πλευρά, the side), 283.
 Pleurodyne. (πλευρά, the side, ὀδύνη, pain), 397.
 Pneumonia, *α*, *f.* Inflammation of the substance of the lungs (πνεύμων, the lung), 525.
 Pneumothorax, *ācis*, *f.* Air in the pleura (πνεῦμα, air, θώραξ, the chest), 544.
 Podagra, *α*, *f.* Gout (ποδῖς, of a foot, ἄγρα, seizure), 399.
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 Polypus, *i*, *m.* (πολύς, many, πούς, a foot), 644.
 Porrigo, *īnis*, *m* and *f.* (porrum, a leak) 693.
 Prurigo, *īnis*, *f.*, Pruritus. (Prurigo, itching, prurio, to itch), 713.
 Psora, *α*, *f.* The itch (ψώρα) 688.
 Psoriasis, *is*, *f.* Dry scall (ψώρα, the itch), 714.
 Ptosis, *is*, *f.* (fr. πτώω, to fall), 445.
 Puerperal. (puer, a boy, pario, to bring forth), 373.
 Purpura, *α*, *f.* Scurvy (purpura, a shell-fish yielding a purple dye), 389.
 Pyæmia, *α*, *f.* (πυον, pus, αἷμα, blood), 371, 497.
 Pyogenic. (pyogenicus, *a*, *um*, fr. πύον, pus, γεννάω, to form), 371, 497.
 Pyrexia, *α*, *f.* Fever (πύρεξις, fr. πῦρ; ἔχω, to hold), 294.
 Pyrosis, *is*, *f.* Water-brash (πύρωσις, burning), 571.
 Pythogenic. (pythogenicus, *a*, *um*, fr. πύθω, to make putrid, γεννάω, to form), 327.
 Quinsy. (cynanche, fr. κύων, a dog, ἄγχω, to strangle), 555.
 Rachitis, *īdis*, *f.* Rickets (ράχις, the back), 387.
 Retinitis, *īdis*, *f.* Inflammation of the retina (rete, a net and itis), 673.
 Rheumatism, *Rheumatismus*, *i*, *m.* (fr. ῥέυμα, a fluxion), 392.
 Rubeola, *α*, *f.* Measles (rubeo, to be red), 701.
 Rupia, *α*, *f.* A cutaneous disease (ρύπος, filth), 708.
 Scabies, *ei*, *f.* The itch (scabies, fr. scabo, to scratch), 688.
 Scarlatina, *adj.*, *us*, *a*, *um*. Febris understood, 353.
 Sciatica, *α*, *f.* Pain in the hip (ἰσχίᾱς, fr. ἴσχιον, the hip), 436.
 Scleritis, *īdis*, *f.* (σκληρὸς, hard, and itis), 665.
 Seorbutus, *i*, *m.* Scurvy (Lat. scorbutus), 389.
 Serofula, *α*, *f.* King's evil (scrofula, a little pig), 5, 383, 664.
 Septicæmia, *α*, *f.* (fr. σήπω, to putrefy, αἷμα, the blood), 371, 497.
 Spermatorrhæa, *α*, *f.* (σπέρμα, seed, ῥέω, to flow), 658.
 Splenitis, *īdis*, *f.* Inflammation of the spleen (σπλήν, the spleen, itis), 611.
 Stomatitis, *īdis*, *f.* Inflammation of the mouth (στόμα, the mouth, itis), 545.
 Stridulus, *a*, *um*. Creaking, 509.
 Struma, *pl.* *us*, *i*, *m.* King's evil (στρώμα, a heaping up), 5, 383.
 Sycosis, *is*, *f.* Chin-werk (συκώω, to convert into a fig), 694.
 Syncope, *es*, *f.* Fainting (συγκόπτω, to cut down), 108.
 Syphilis, *īdis*, *f.* (fr. συν, together, φιλέω, to love), 652.

- Tabes (*is, f.*) mesenterica. (*tabes*, a consumption, *μεσεντέριον*, the mesentery), 593.
- Tænia, *æ, f.* Tape-worm (*tania*, a riband, from *τείνω*, to stretch), 729.
- Tetanus, *i, m.* Locked jaw (*τείνω*, to stretch), 460.
- Thrombosis, *is, f.* (fr. *θρόμβος*, a clot of blood), 497.
- Tic dolozeux. (Fr. *tic*, a convulsive motion, *dolozeux*, painful), 434.
- Tonic, *tonicus, a, m.* (fr. *τείνω*, to tighten.)
- Tonsillitis, *idis, f.* (*tondeo*, to clip? and *itis*), 555.
- Tracheitis, *idis, f.* (*τραχεῖα ἀρτηρία*, rough artery, *itis*), 508.
- Trismus, *i, m.* Locked jaw (*τρισμός*, fr. *τρίζω*, to gnash the teeth), 460.
- Tympanites, *æ, m.* Drum-belly (*τύμπανοειδής*, like a drum), 584.
- Typhoid. (*typhus*, and *ειδος*, like), 327.
- Typhous. (*typhosus*, pertaining to typhus), 323.
- Typhus, *i, m.* (*τυφός*, fr. *τυφώω*, to stupefy), 318.
- Urticaria, *æ, f.* Nettle-rash (*urtica*, a nettle), 700.
- Vaccina, *æ, f.* Cow-pox (*vaccinus*, belonging to a cow), 346.
- Varicella, *æ, f.* Chicken-pox (dim. of *varus*, a spot), 349.
- Variola, *æ, f.* Small-pox (dim. of *varus*, a spot), 339.
- Varioloid. (*variola*, small-pox, *ειδος*, like), 341.
- Zymotic. Contagious and infectious diseases (*ζύμωσις*, fermentation, fr. *ζύμω* to ferment). An inappropriate term.

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